SPRAT

THE JOURNAL OF THE G QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

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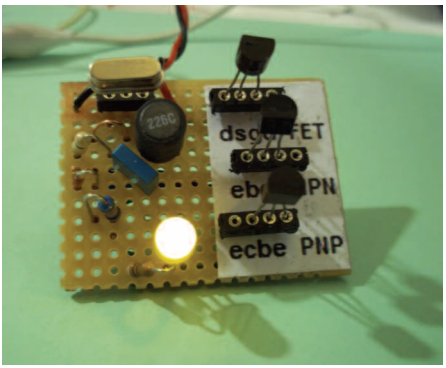
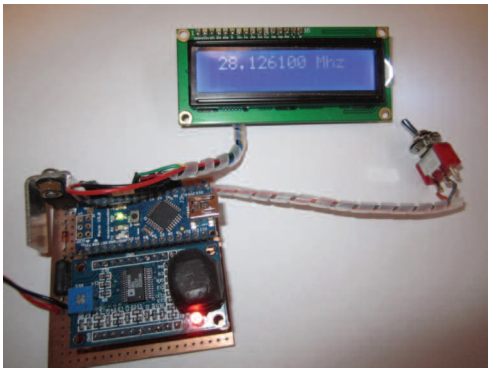


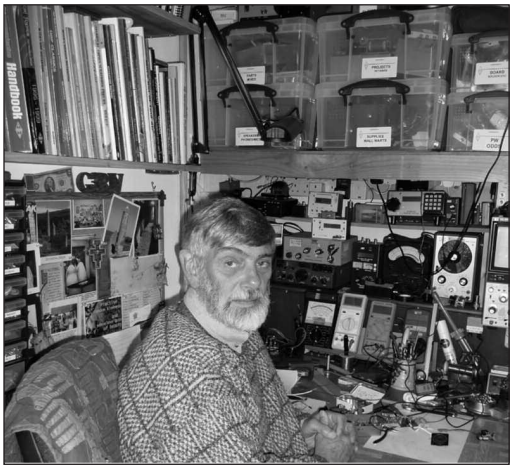
G4UMB 4 in One Tester



WSPR Calibration Tool

In this issue:

JOURNAL OF THE G QRP CLUB



Rev. George Dobbs G3RJV

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We were all saddened by the passing of Gordon Bennett, G3DNF, chairman and one of the founder members of the club. At the behest of his family we are pleased to announce the **Gordon Bennett Trophy** to be awarded each year to the member thought to have submitted the best practical article to SPRAT. This may not necessarily be the most complex article; we welcome simple but elegant circuits. The trophy will be a keepsake plaque and the winner announced in the autumn issue of SPRAT. If possible we will present the plaque at the QRP Convention.

I look forward to seeing many of you at the Rishworth Convention; details of which appear on the next two pages.

72/3

G3RJV

The W1FB Memorial Award 2014/2015

An easy topic this year - "My favourite weekend project". There are dozens of little construction projects laying around on member's work benches. So …. Describe your favourite little project for other members. It can be original work but I am happy to see existing projects that have been improved or updated.
Please supply circuit diagram(s), full component values and brief notes. A SPRAT formatted page (MS Word) can be supplied on request but any format including hand written may be used. A special plaque is presented for the best design.

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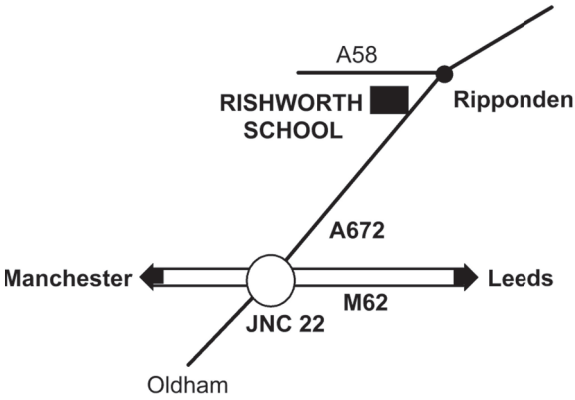
THE G QRP CLUB
MINI-CONVENTION

(in conjunction with the Halifax Radio Society)

Saturday 25th October 2014

The Rishworth School, Ripponden



OPENS AT 10.00am
ADMISSION £3.50
DOORS OPEN 10am
TALK-IN S22
LARGE SOCIAL AREA
LECTURES ON
QRP SUBJECTS
BRING & BUY - SURPLUS
JUNK - COMPONENTS
KIT TRADERS
FOOD & DRINK ALL DAY
WITH THE FAMOUS PIE AND PEAS

The Rishworth School is on the A672 (Ripponden) road from Junction 22 on the M62. [Postcode: HX6 4QA]

Look for the G QRP Sign on the left after you have passed all the sheep!

CONSTRUCTORS EVENING (Friday Evening before the convention) Including a Buildathon (see overpage for details) to be held at Premier Inn, Salterhebble Hill, Halifax, HX3 0QT. (Tel: 0871 527 8486) www.premierinn.com/en/hotel/HALPTI/halifax-south

Our suggestions for local accommodation:
The Premier Inn, Milnrow. Junc 21 on the M62 (Tel: 0871 527 8936) www.premierinn.com/en/hotel/ROCTHE/rochdale
The Malthouse, Rishworth. Almost next door to the school – only 5 rooms (Tel: 01422 822382) www.malthouserishworth.co.uk
The Turnpike Inn, Rishworth, excellent but quite expensive. (01422 822789) www.turnpikeinn.com

Radio Constructor's Evening
Friday 24th October from 7.30pm
(The evening before the Rishworth Convention)
Premier Inn, Salterhebble Hill, Huddersfield Road,
Halifax, West Yorkshire HX3 0QT.

We will also have a social gathering in the same room on the Saturday evening for those who are still at the hotel – talk radio and QRP

- **Buildathon**

Why is Dom so happy? Well, he has built a little QRP[p] 40m transmitter in about an hour at an open air buildathon in Sweden under the guidance of Johnny, SM7UCZ. You too could build this transmitter in the 2014 Rishworth Buildathon (and Johnny with be there). To add more interest the club is offering a special plaque to the member who submits the best log using the transmitter for 28 days from the time of construction.

Book your place with G3RJV or G3MFJ as below.

Bring along your favourite QRP projects – show them off and tell us about them.

- **The Buffet Supper.** Last year it cost the club quite a lot of money for the Friday and Saturday buffets, so this year we hope to supply a hot buffet on Friday and make a modest charge. On the Saturday, we suggest that those still present eat at the on-site restaurant and there will be free tea and coffee in the meeting room

If you are interested in being part of the Constructor's Evening let George, G3RJV, **(g3rjv@gqrp.co.uk)** or Graham, G3MFJ, **(g3mfj@gqrp.com)** know (postal addresses are also in SPRAT).

Hints & Tips

Mike Bowthorpe, G0CVZ, mike@czechmorsekeys.co.uk

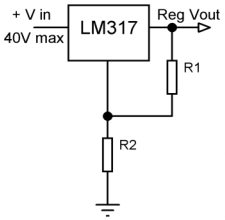
When you want to cut holes for SO239 sockets use a 16mm Q Max Sheet Metal Punch and when you want to remove the burrs on holes and cut-outs use a Burr Deburring Tool (it's a bit like using a large drill to remove burrs, but is designed to do a far better job) Both available on Ebay. The Burr Deburring Tool costs about £25 for UK made one, or £2 for a Hong Kong one (which works fine on aluminium).

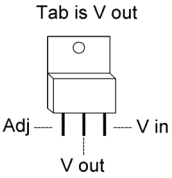
One of the most useful tools however is a "nibbler". I can only find these at Rapid Electronics part number 86-2150. This tool enables you to cut square and the larger round holes in aluminium sheet as easy as pie.

LM317 Voltage calculator chart

G4COE. Gqrp 8621 D. Smith. 54, Warrington Road
Leigh, Lancs. WN7 3EB

R1 is given as 240 Ohms; I usually use a 220 or 270 Ohms so we'll use 180, 220, 240 and 270 Ohms for R1 in our chart. Replacing R2 with a preset or 'pot' the output becomes adjustable. Here is the basic circuit.





———————R1 ———————

R2	180	220	240	270
68	1.72	1.64	1.60	1.56
82	1.82	1.72	1.68	1.63
100	1.94	1.82	1.77	1.71
120	2.08	1.93	1.88	1.81
150	2.29	2.10	2.03	1.94
180	2.50	2.27	2.19	2.08
220	2.78	2.50	2.40	2.27
240	2.92	2.61	2.50	2.36
270	3.13	2.78	2.66	2.50
330	3.54	3.13	2.97	2.78
370	3.82	3.35	3.18	2.96
390	3.96	3.47	3.28	3.06
470	4.51	3.92	3.70	3.43
560	5.14	4.43	4.17	3.84
680	5.97	5.11	4.79	4.40
820	6.94	5.91	5.52	5.05
1K	8.19	6.93	6.46	5.88
1.2K	9.58	8.07	7.50	6.81
1.5K	11.67	9.77	9.06	8.19
1.8K	13.75	11.48	10.63	9.58
2.2K	16.53	13.75	12.71	11.44
2.7K	20.00	16.50	15.31	13.75
3.3K	24.17	20.00	18.44	16.53

2.5V is a 'magical voltage' simply make R1 and R2 the same value.

WIFB MEMORIAL ENTRY

Simple DDS VFO

Terry Mowles VK5TM vk5tm@internode.on.net

Ever since the appearance of those cheap AD9850/51 DDS modules from China, there have been numerous articles and websites on how to use them. Some of them have been so feature laden to the point of rivalling commercial rigs.
One thing that there didn't appear to be, was a no bells and whistles, down to earth, simple vfo, hence the name of this project.
This project is designed to replace those simple 1 or 2 fet/transistor vfo's that many use for their QRP rigs or experimenting in general. It can even be used to replace the VXO or Xtal oscillator in those rock bound rigs. Tuning was conceived to be over a limited range such as 5 MHz to 5.5 MHz rather than from one end of the HF band to the other.

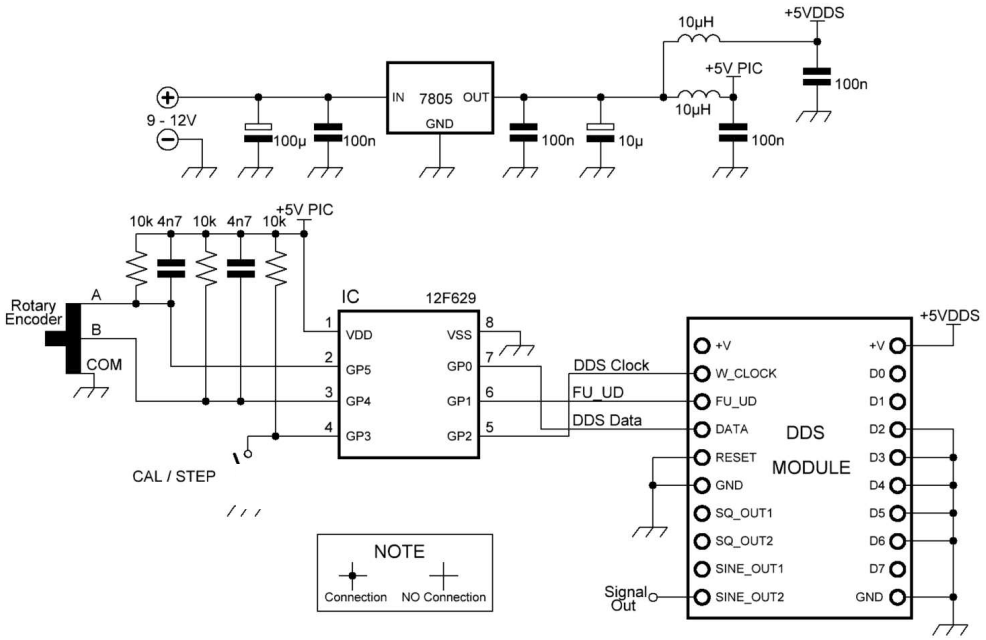
A look at the circuit will reveal that there is very little to it, just a DDS module, 12F629 8-pin PIC, power supply and support components. All on a 2 inch square pcb. Frequency change is accomplished with a rotary encoder and a toggle switch changes between the two step sizes of 100Hz and 1000Hz (different steps sizes can be programmed if desired).

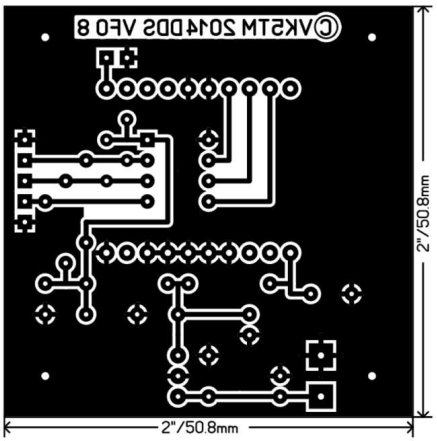
No provision has been made for filters or amp stages on the pcb as, in some cases it is not needed and in others, the builder may have their own favourite circuit to use. A simple amp or filter can easily be made dead bug style on a scrap piece of pcb material. I would advise installing the Simple VFO in its own shielded enclosure to prevent interference or interaction with other parts of your circuit.

Built into the software is the ability to account for any difference in the DDS modules oscillator frequency via a calibration routine. This needs only to be run once and the updated values are stored in the PIC. Also, the PIC will remember the last frequency used and returns to that frequency when turned on again. To guard against any possible interference from the PIC, it goes to sleep ~ 2 seconds after the frequency stops changing and wakes up again as soon as the encoder is moved.

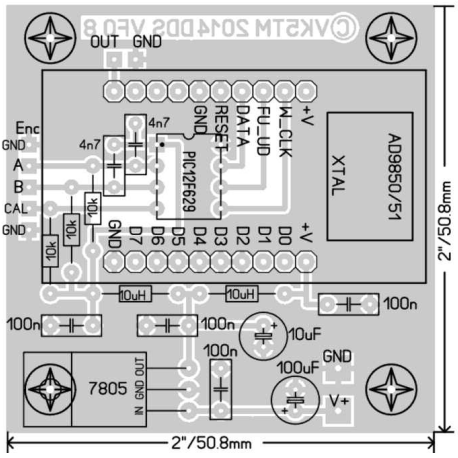
Construction is straight forward and with so few components, should be completed in very short order. I would suggest, however, doing a voltage check before installing the PIC or DDS module.

There is more information on this project on my website, including calibration procedure and how to calculate new frequencies. The PIC source code and an example Hex file for the AD9850 DDS module set up for a range of 5 MHz – 5.5 MHz can also be downloaded at: http://www.vk5tm.com/homebrew/dds_vfo_8/dds_8.php
Information on using the AD9851 module is in the source code file.


10µH
+5VDDS
+5V PIC
100n
9 - 12V
IN 7805 OUT
GND
100µ
100n
100n
10µ
10µH
100n
10k 4n7 10k 4n7 10k
+5V PIC
Rotary Encoder
A
B
COM
IC
12F629
VDD
VSS
GP5
GP0
GP4
GP1
GP3
GP2
CAL / STEP
DDS Clock
FU_UD
DDS Data
+5VDDS
+V
W_CLOCK
FU_UD
DATA
RESET
GND
SQ_OUT1
SQ_OUT2
SINE_OUT1
SINE_OUT2
DDS
MODULE
D0
D1
D2
D3
D4
D5
D6
D7
Signal Out
NOTE
Connection
NO Connection


2"/50.8mm
2"/50.8mm

PCB


OUT GND
Enc
GND
A
B
CAL
GND
4n7
4n7
10k
10k
10k
PIC12F629
XTAL
AD9850/51
10uH
10uH
100n
100n
100n
100n
10uF
100uF
GND
V+
7805
2"/50.8mm
2"/50.8mm

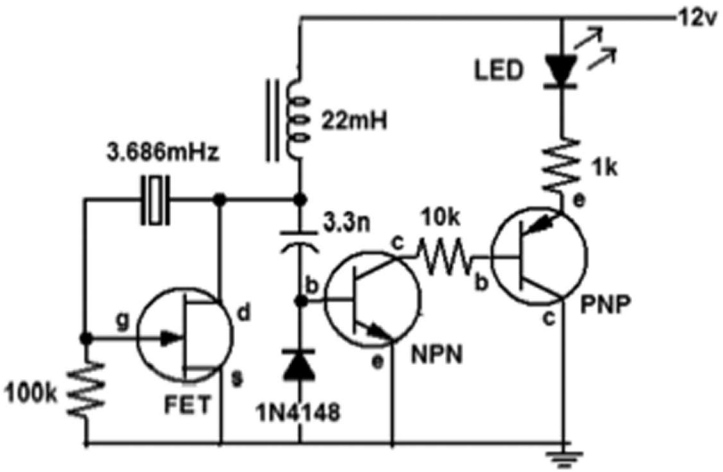
LAYOUT

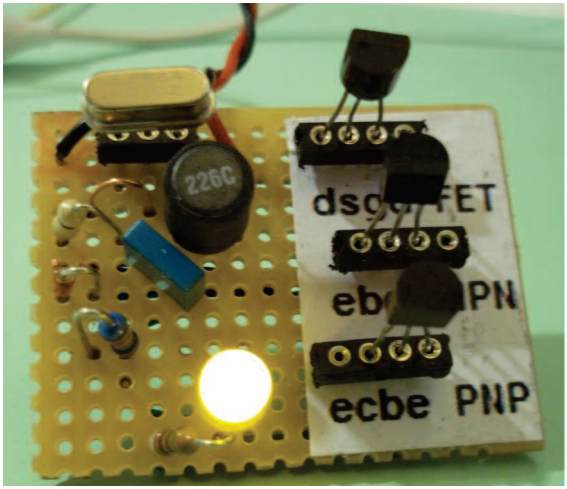
4 in One Tester

Peter G4UMB 63 West Bradford Road Waddington Lancs. BB7 3JD

This is a basic 4 in one testing board to give an indication of whether a transistor is working. It is also useful to check that a crystal works on frequency in conjunction with a radio receiver. To begin ensure that all the transistors are good ones and the LED lights. Then exchange the one you are going to test. Finally remove the crystal for a moment to ensure that the LED goes out to prove that the transistors turn off and are not just shorted .

The circuit works by the FET Pierce crystal oscillator oscillating and then this signal is rectified which is able to switch on the next transistors to light the LED. . I felt no need to put this in a box so it's a cheap test rig and only takes an hour or two to make. Purposely made with three different types of transistors it will work with JFET positive types. Such as 2N3819, BF245 , J113 etc and small NPN transistors like 2N2222 , BC108 etc. and PNP types BC212, BC558 etc. The wire ended crystals which the club sell fit nicely into the IC socket It's better to use the turned pin type IC socket with the round holes which I have cut into sections. It's helpful to label the sockets which as you can see from the picture they are done in the sequence EBCE and DSGD to accommodate most transistor body connections. I have only tested with a cheap 3.686Mhz crystal. The unit is built on stripboard.





The G4UMB
4 in One Tester

Fitting lids to enclosures made from copper clad board

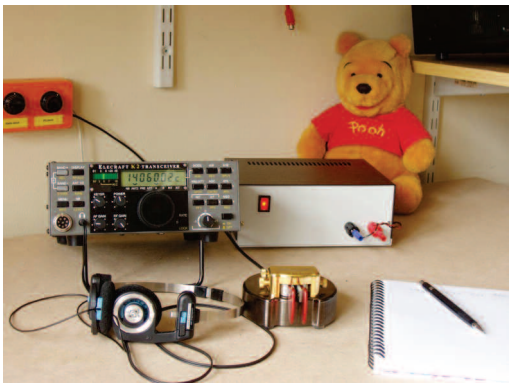
John Powell, GW4LPB (john@qrp5wattsmax.plus.com

This is an idea that I devised when making a small enclosure for a vfo/receiver project and I thought others may find it of use.
I built the sides and base of a box and tacked them with solder but it seemed quite a chore to align and fit the lid using the usual 3mm nuts and bolts that have to be soldered into each corner at the top of the box, more so when it probably would not have to be removed again once everything is set up and running correctly. Instead of cutting bolts to length and soldering at the corners at the top edge I cut four lengths of 18swg copper wire about an inch long and soldered those into the corners instead, I got the lid which I had cut to size earlier(this must overlap to the edges of the sides of the box) and carefully touched the corners of the lid on a fine grindstone removing the points at each corner of the lid, the lid is then placed inside the wire studs, resting on the top edges of the box and the excess copper wire is cut of leaving it flush with the top of the lid. Once everything is set up, in my case by trimming a cap through a small hole in the top of the enclosure, the job is finished by sealing the lid with aluminium tape. The process is much quicker than the nut and bolt method.

Extra Tip
When making enclosures from copper clad board, a very useful aid is the SBSS Clamp available from Club Sales (see the back page). The clamps align and hold the boards in place prior to soldering; producing very neat boxes. (G3RJV)

13V 3A Regulator with Crowbar Protection

Graham Stannett, G4VUX <graham.stannett@gmail.com>



I wanted a small linear power supply but I was concerned about the risk of a short developing across the collect-emitter junction of the pass transistor which could cause damage to my radios. A crowbar circuit seemed sensible so I carried out some experiments and came up with a suitable circuit. There's nothing new about the design but as not all published circuits include over voltage protection, I thought it may be of interest to other Sprat readers.

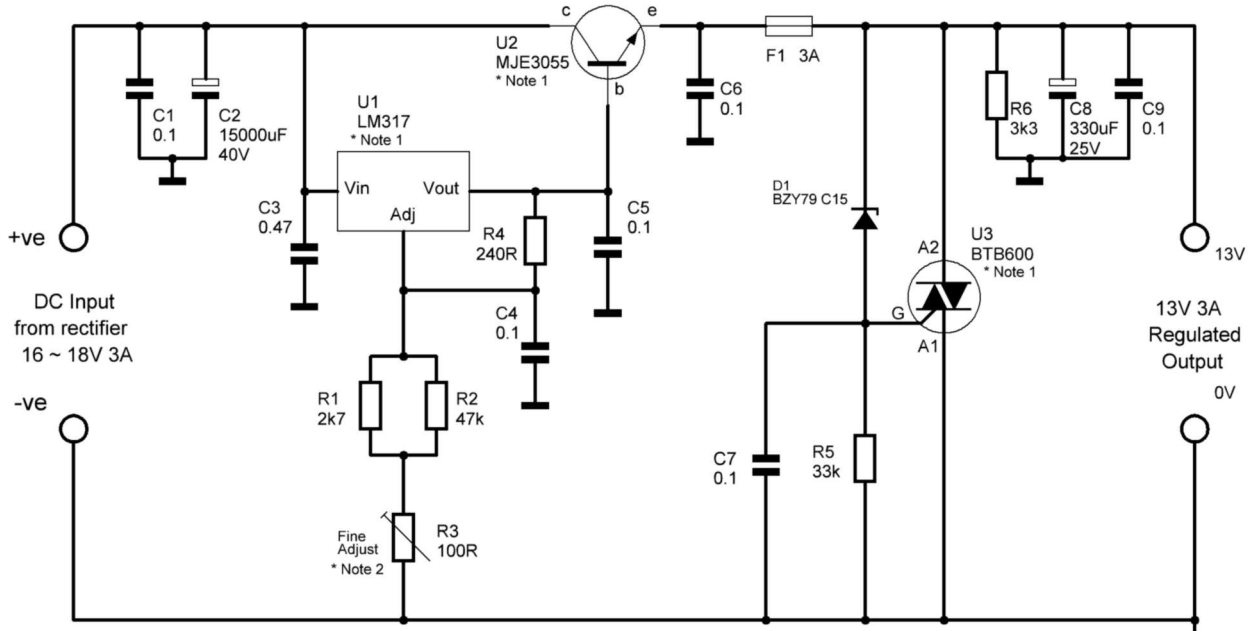
The principle of operation is that a BTB600 triac is strapped across the output terminals of the supply. It will remain in a non-conducting state so long as the gate is held low with respect to anode A1. If the voltage on the gate rises, the triac will conduct and blow the fuse. The BTB600 is rated at 16A continuous and will withstand a much higher peak current for short periods.

A zener diode sets the threshold voltage. I used a 15V BZX79 which triggers the crowbar at 15.4V. Once the traic is turned on, it will latch up and stay on until the DC is removed from its anodes.

The circuit is quite simple but it's very fast and reliable. To test the operation of the crowbar, temporally disconnect the emitter of U2 and replace the fuse with a light bulb. Apply DC from a current limited bench power supply to the lead that was connected to U2. Gradually increase the input voltage and the bulb will illuminate when the trip threshold voltage is reached.

The regulator circuit I have used will survive a real world trip and fusing. In use, the output voltage falls by about 0.5V when the current is increased from zero to 3A. This is about the same voltage drop that would be expected from a 12V 7Ah sealed lead acid battery working into the same load.

I built the entire circuit onto a large heatsink. As with any series regulator, it is important to consider the power dissipation in U2. For a 13V 3A output the DC at C1 should be about 16 - 18V at full load, which will keep U2 well within its safe operating area. I included R3, a 100R trimmer, for fine adjustment of the output voltage to allow for the tolerance variation of the LM317 but it can be bypassed by taking the bottom junction of R2 and R1 to 0V.

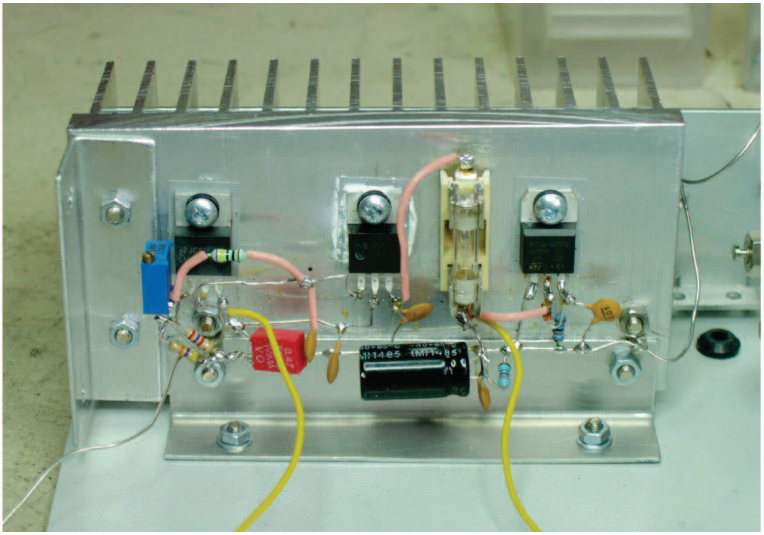


* Notes:
1. All active devices require a heatsink
2. Adjust R3 for 13V output at full load

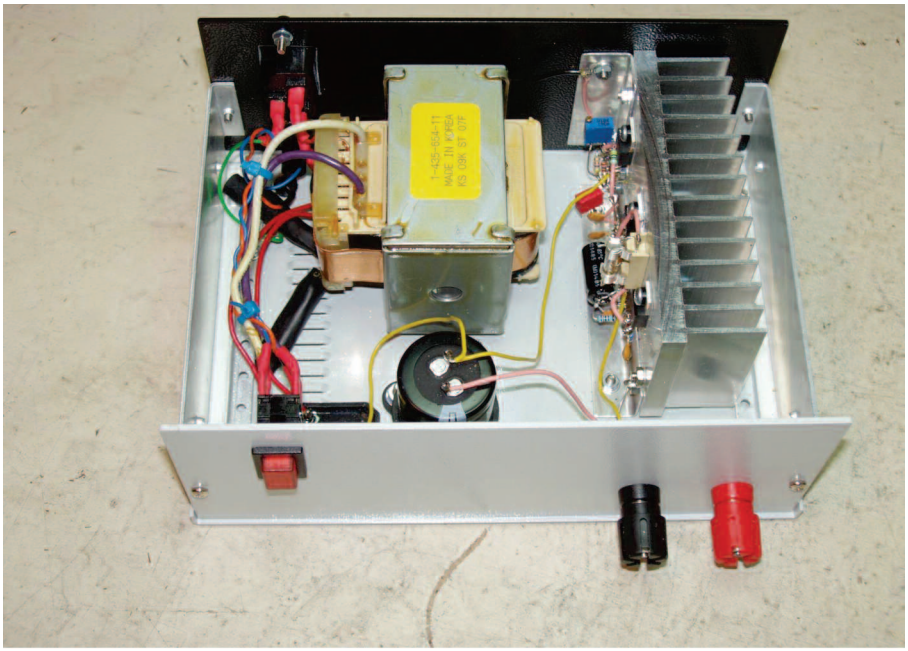
G4VUX ~ GQRP #8823

2 May 2013

13V 3A Regulator with Crowbar Protection



Heatsink



PSU with lid off

A Quick and Easy GPS-Locked Frequency Standard

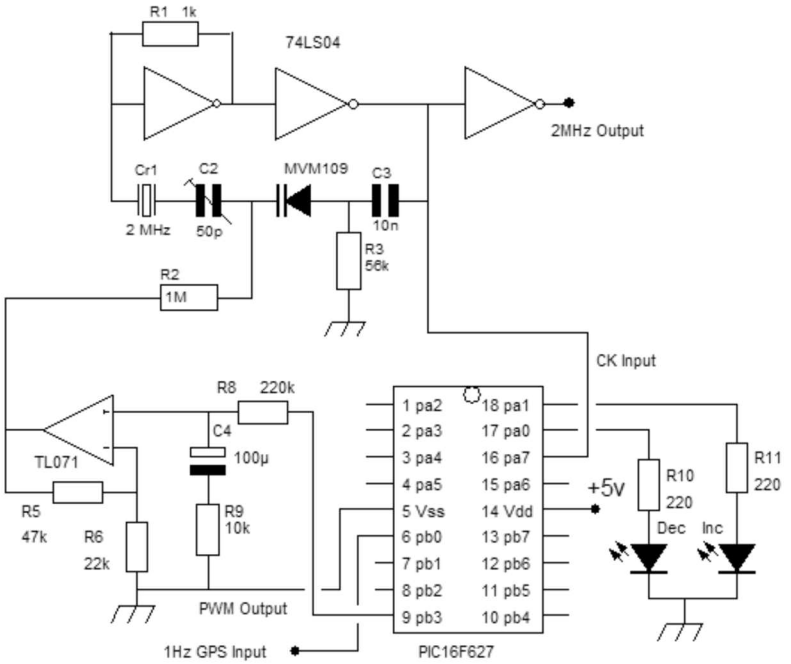
Dr Andrew Smith G4OEP (aj-smith@blueyonder.co.uk)

The more you become involved in home construction and design, the more necessary it is to have stable, reliable and precise frequency measuring equipment, both to evaluate home construction products, and to ensure compliance with band plans and licensing requirements. Some amateur modes, such as qrss, require extreme stability and precision and many qrss operators use rubidium standards to control their rigs, although an ovened crystal will give adequate stability while leaving calibration uncertain. So a quick and easy frequency standard which allows reliable and precise frequency calibration is highly desirable. In the UK the LF station *MSF* at 60kHz is intended to be a national resource for frequency and timing calibration. I have a system which phase-locks a 2MHz VXO to the 60kHz carrier, the 2MHz output serving as a timebase for a home brew frequency counter with 1Hz resolution in the HF region (see G4OEP website http://g4oep.atspace.com/).

Unfortunately MSF is too often off-air, so GPS therefore seems a useful alternative. Most easily-available GPS receiver modules include a 1Hz output with a claimed precision of parts in 10^11. Technically, locking an HF oscillator to a 1Hz standard seems a tricky task likely to raise problems of lock-time, phase noise, etc. But the technique illustrated here has proved to be surprisingly quick and easy, and although I have not evaluated performance rigorously, it is clear that this exceedingly simple technique is useful. Lock can be achieved in about 3 or 4 minutes from a cold start and there is no perceptible phase wobble relative to a free-running crystal even when compared on a dual-channel scope with a 20ns/div timebase. The GPS-locked system is more than adequate as a timebase for a frequency counter, and the purity of tone of the harmonics in the HF band indicates that it is also good for even the most demanding of amateur requirements in other applications. In short, the technique is quick, simple, and highly recommended.

A PIC 16F627 is used to lock a 2MHz crystal although other frequencies can also be used. The internal T0 counter and the pulse-width modulation (PWM) module of the PIC are exploited. The technique is as follows:

The PIC's internal clock is derived from an external 2MHz VXO, which is tuned over a narrow range by a varactor diode. Inside the PIC, the clock input is divided by 4 to provide the CPU clock. T0 is an 8-bit counter which, when enabled, increments at the CPU clock frequency and creates an interrupt each time the counter overflows. The interrupt service routine preloads the counter with a fixed number, (nominally 6) every time T0 overflows so that successive overflows occur every 250 CPU clock cycles, or every 1000 VXO cycles. The result of this is that interrupts occur every 500us (2kHz). Because the T0 counter runs continuously, its contents represent a running total of half-milliseconds, mod 250, and this is a continuous count of the VXO cycles, divided by 1000.



The GPS 1Hz pulse is applied to the external interrupt input to the PIC. These interrupts are not enabled, but the interrupt flag is monitored in a loop in the main program, and each time a rising edge of the GPS 1Hz occurs, the contents of T0 are read. Because T0 is cumulative, its contents can be interpreted as a phase error. Since T0 counts mod 250, and 500kHz is an integer multiple of this, T0 will have the same value each second if the 2MHz VXO is exactly on-frequency. If the VXO is running too fast, the read value of T0 will steadily increase, while if it is running slow, the T0 count will steadily decrease.

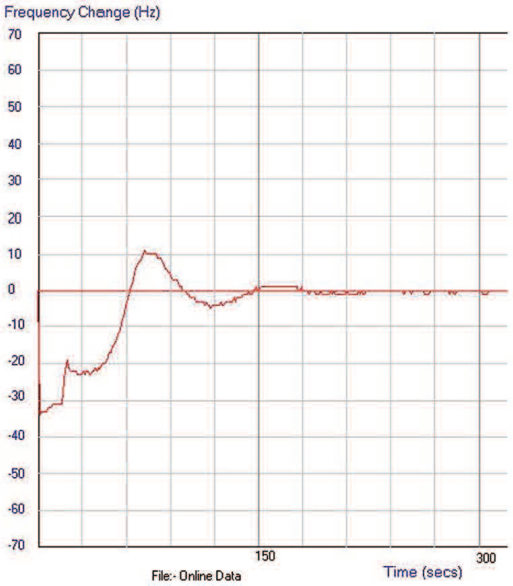
To complete the frequency control loop, the value of T0, as read each second, is written to the register of the PIC's PWM module which controls the period of the PWM waveform, the high phase being fixed, set in the initialisation routine of the software. The PWM output is filtered to recover its dc component, amplified, and then applied to the VXO as a frequency control input. If T0 increases, for example (due to the VXO running fast) the average PWM output voltage falls, the capacitance of the varactor increases, and the VXO frequency is corrected in the required downward direction.

The system could lock to any frequency (f) which satisfies the equation f = 1000*Ni where Ni is an integer - the number of interrupts each second (2000 in this application). The nearest alternative frequencies are thus 2MHz +/- 1kHz. A crystal will not drift by as much as 1kHz, so there is no possibility of a false lock. Clearly other frequencies can be generated by simply changing the crystal, provided the target frequency is an integral

number of kHz. The system has been tested with a 4MHz VXO, and I can confirm that it works well at this frequency without any change in the software. The capture transient can be expected to be slightly different at different output frequencies.

The loop filter consists of a 100uF tantalum capacitor with a 220kOhm resistor in a first-order LPF configuration.

A 10k resistor is added in series with the cap to increase damping. Damping is not optimal, but is adequate (see graph; this shows the locking transient following a completely cold start, including the capture time of the GPS receiver).



An amplifier with a voltage gain of about 3 is included in the loop. The op-amp is powered from a MAX232 chip which provides +/-9v supplies from a single 5v input. This allows a useful increase in the range of the control voltage (from about 5v maximum from the PWM module, to about 8v).

The software can be downloaded using the link indicated below. Astonishingly, the basic control system uses just 49 bytes of assembled opcodes. To my mind this is amazingly simple and efficient. The component count could be reduced by omitting the opamp, and by using the PIC's internal oscillator amplifier instead of the TTL inverters, but I leave these ideas for experimenters to explore.

Additional information and updates can be found here:
http://g4oep.esy.es/gpspll/gpspll.html

Software can be downloaded here:

http://g4oep.esy.es/gpspll/gpspll.zip

I would like to thank Hans Summers G0UPL for generously providing the SKM52 GPS receiver used in this project.

Mods to the ZL2BMI DSB Transceiver –

by Eric Sears ZL2BMI and Bob Sewell ZL2ASO
sears@xtra.co.nz

Gracious – its three years since the publication of this circuit in Sprat issues 146 and 147, and over that time a number of mods have been made but not reported!! It was some comments by Dave Richards AA7EE on his web page and some subsequent emails that prompted me to get writing.

Early on a number of people had a problem with carrier leakage on transmit. We had seen only traces of this on our first three or four rigs, but when I built a rig for a hunter who wanted something a bit more powerful to use while hunting in outback areas – it really became a problem.
Examining the circuit, it was clear there was a design fault! Pin 2 of the 602 is connected to a tuned circuit *all the time*, so in transmit mode rf can easily be picked up (at the T/R switch or even worse if a relay is used), and this unbalances the 602. It can also lead to a "fuzzy" signal even if little carrier is detected. The proof of problem was simple – in transmit mode – with some leaking carrier out, the top of the aerial coil was shorted to ground – presto! No carrier!
Transistor switches
You will see that Peter Parker in his 80 phasing rig had a similar problem and used a relay to disconnect the input. I believe AA7EE tried something similar with the ZL2BMI rig, but it still leaves the input "floating".
I had actually tried a relay to *short* the input and it worked fine (with 10 watts of DSB), but it seemed clumsy and I didn't have any more of the tiny relays I had used. Surely a diode switch would work? But no – it reduced it, but the 0.6 volts was still more than enough to cause problems.
What about a transistor switch? Bingo! But so much simpler than I had thought!
I had always thought that for a transistor switch to work it needed dc volts on the collector. However, after some experiments I "discovered" (you probably already knew this!) that even if both emitter and collector are at "ground potential" you can still use it as a switch (at rf). Yes, I know FET's have been used this way.
So the cure – any old signal transistor (BC547, BC338 etc). Put the collector to the top of the 40 turn coil (which is at dc ground via the coil), the emitter to ground, and the base via a 10k resistor to the T+ line. You can prove it works in RECEIVE mode by just putting volts onto the 10k resistor; the signal disappears almost completely.

We then "discovered" that switches like this could be used in other ways; eg there is a "burp" when going from transmit to receive which seems to be caused mostly by the time the 100uf cap on the transmit board takes to discharge. We tried a similar transistor across it, operated by the R+ line and it worked fine – though it pays to insert a small value resistor in series to limit the current from the cap. However, an even simpler fix is just a 2.4k across the cap. It wastes 5ma on transmit, but that is very little compared with the

transmit current. You could experiment with the highest R-value possible to stop the burp! (No, this is not a soft drink ad!)

Dual band and higher power

We have also built a good number of dual 80/40m rigs now, with 5 watts out, and my latest, smallest one is just 75x50x25mm and weighs about 120gm. Frequency is by plug-in crystals OR resonators. The socket is made from a piece of I/C socket glued on the inside of the panel.

The aerial coil is tuned with about 56pf for 40m, and a further 180pf is switched across for 80m using a computer jumper on the front panel in some cases. If you need filters at the end – plug-in for each band is easiest.

By using hotter transistors for the first rf amp (similar to 2N2222) running at about 35ma, we can get more than 200mW from the first stage. This can drive a BD139 to about 3+ watts on 80m or 1.5 watts on 40m. To get to 5 watts it is necessary to use a better rf transistor with a HIGH Ft for the final. Some of the MFR types are good, though even a 2SC1096 (genuine Japanese one) will do 4+ watts. Beware cheap Chinese copies! However, to do this, better matching of the stages was needed.

We made a simple bridge to measure inductance, so that we had some idea of the characteristics of the various ferrite beads and formers in the junk box – fairly high inductance is needed for small transformers -at least 10uH for 5 turns.

Our final line-up of transformers was:

Input transformer - 16:1 (20 turns tapped at 5 turns on a very small bead – using about 38swg wire)

Interstage – 9:1 (27t, tap - 9t) (about 8mm doughnut-shaped bead)

Output – depends on transistor. For a BD139 about 1:2 (14 t tapped at 10 t – bottom to +ve, tap to collector)

- For VHF transistors – 1:4 – (6 hole ferrite bead, bifilar winding through all holes) : 5 + watts out!

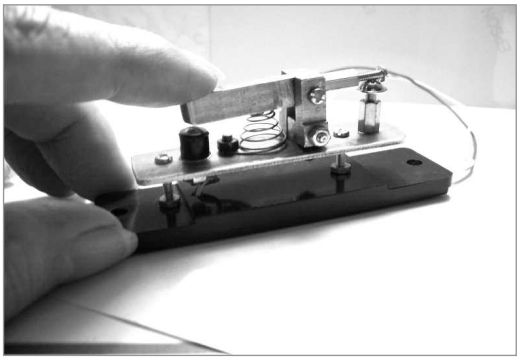
If you only want about 2 - 2.5 watts from a BD139 you can omit the interstage transformer.

For each of these the biasing has to be “tailored” for the Hfe of the device – 35ma TR1, 30-40ma TR2.

I shall try to put a few pics and other ideas on the www.mightymessage.com website from time to time. Eric Sears

The Electrician's Delight

Peter Griffiths GW8PNE, 6 Bradford Ct. 19 Amias Dr. Edgware. HA8 8GT

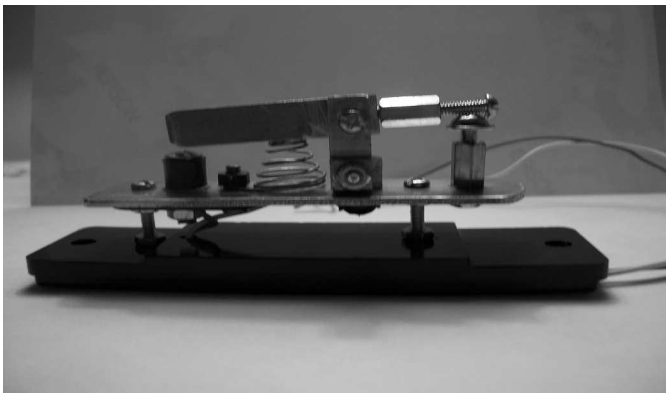


I trained as an electrician when I left school, obtaining my ticket in 1970. My interest in radio goes back to schooldays in the early 1960s when my Dad bought me the Tri-Onic kit by Triang. I passed the RAE and became a licensed amateur in 1978.

The above picture shows the result of being a radio ham and an electrician. The base is bakelite and is an old blanking plate from a Crabtree distribution board circa 1990. Above it is a brass plate from an old circuit breaker (can't remember when I acquired this). The upright pillars are cut down live and neutral pins of a 13 amp plugtop and the moving arm is the earth pin from the same 13 amp plug top.

As they are solid brass I guess I must have acquired these in the 1970s or 80s.The front spring is from an old battery box, the back stop which adjusts the travel is made from a hexagonal stand off pillar for mounting PCBs, as is the extension to the moving arm.

The circuit is completed when the arm touches the upright pillar which is no more than a brass bolt inside a plastic collar from an old potentiometer.
Does it work? Gripped between the thumb and second finger the fore finger then taps away merrily in the manner of our colonial cousins across the pond – the "slap" method I believe! I can get up to 12 – 15 WPM and it feels remarkably light.



I built it to go with my homebrewed OXO and FOXX3 as all my other keys are bigger than the transmitters. Cost is nil, time invested about 8 hours over 3 weekends, only hand tools used …..and value? Priceless

Cavalier40 – A Special Direct Conversion Transceiver

Gerard Kelly G4FQN, gerardkelly429@googlemail.com

The Cavilier40 Transceiver uses Direct Conversion Receiver (DCR) techniques in it's receiving section as an alternative to a more complex superhet design. What makes it special is that the Cavilier40 will operate 'voltage-for-voltage' from a power supply or battery without any significant difference in results (power supply dependent to some extent). For that reason the Cavilier40 should appeal to previous DCR/T constructors who may wish to put this circuit to the test, and constructors who want a home-build project with a construct and operate result, without using batteries, if only in the early development stages.

For anyone unaware of the significance of the above statements I have included a brief history on the DCR and to illustrate further the aspects of the Cavilier40 circuit that are different, I have included a derived description which it's not so much technical, as a little complex. Skip this by all means.

Principles behind a DC Receiver:
A DCR selects, using a simple tuning circuit, an amateur radio signal which is then mixed with a local oscillator signal 'shifted' in frequency by around 400Hz – 1000Hz from the received signal frequency. One of the resulting audio sidebands is then amplified to a level sufficient to power a headphone. Such is the high gain required, that stability plays a large part in the design of the circuitry not to mention placing restrictions on component layout.

The circuits used in a DCR filter-out the predominantly low frequencies which are the most likely cause of this instability and amplify only the wanted signals. To minimize problems, a limit is set on the overall gain achievable, and it's for this reason that loudspeaker operation is seldom attempted. As unwanted signals emanating from a power supply, and of course it's operational frequency fall close to the audio range of a DCR, a battery power source is normally used.

The Cavalier40 from the beginning;
The Cavilier40 started design as an attempt to find alternatives to the almost standard circuitry already used in a DCR by taking a more 'Cavalier' approach to it's design and ruling nothing out. DCR circuitry invariably uses at least one bandpass filter followed by a high gain amplifier, the TDA7052 has two power amplifiers one inverting one non-inverting, it sounded like a good starting point. I constructed a circuit using a variable resistor to control and vary the gain. Negative feedback was then applied to the inverting amplifier, it was then that I knew I was on a winner, a eureka moment? Certainly! The TDA7052 appeared to be the perfect answer to all the signal processing requirement of a DCR, and to resolve all its previous drawbacks both documented and personally experienced.

What makes the Cavilier40 Receiver Special?
It uses the TDA7052 as a dedicated DCR signal processing IC and the best way to understand how this works is to take it step by step. In the TDA7052 earphone audio level outputs can be obtained from either output, and in simple terms, internal circuitry switches the IC from loudspeaker to earphone operation. We use the non-inverting output of this IC in the Cavilier40 to amplify the signal and negative feedback is applied to the inverting output. We set the gain at a maximum by the 100k resistor on pin 4 and if we did not apply any feedback on the inverting amplifier the result would be that both amplifiers would work at a maximum gain, bear with, nearly there!

Both amplifiers share a common input so any applied signal that is to be amplified must appear here, which means that the output is the result of the difference in signal amplitude between both amplifiers and that the only signal in the output will be determined by the negative feedback alone which is the same as saying we have (Automatic Volume Level Control) AVLC. Meanwhile, the non-inverting amplifier provides the maximum gain possible to the wanted signal. The frequency response of the applied negative feedback providing the desired bandpass filtering.
Now to answer the question; in a standard op-amp. amplifying the signal and applying some of it back to it's inverting input reduces it's gain by lowering the level of this signal, it cannot entirely eliminate it, this is not the case in the circuitry used in the Cavilier40.

Circuit Description:
My headphones are 32R + 32R and inexpensive, the audio level can be reduced by changing the value of R1 from 22k to 33k or 39k.
The majority of circuitry used in the Cavilier40 has already been covered elsewhere but T1 has been added, this circuit maintains mixer drive levels as the power supply voltage reduces or increases it's output is switched on/off. Without this, a dying "squirt" of, 'low-level' oscillation will be heard on each occasion, annoying when wearing headphones.
The mixer pre-amplifier in combination with IC1 produce a high-gain with a respectable signal to noise ratio. IC1, and it's high common mode rejection ratio, rejects unwanted signals common to both supply rails preventing any instability between these two stages.

FET 1-3 2N7000
VC1-2 Polyvaricon Capacitors(A = 8 to 140pF, O = 6 to 60pF)

T1	10T primary 5T secondary FT50-43 or BN43-302	
T2	8T trifilar	FT50-43
T3	8T trifilar	FT50-43

T4 Aerial Tuning circuit coil winding details:

4.7uH	31 turns T50-2	red
4.7uH	34 turns T50-6	yellow
4.7uH	29 turns T68-2	red
4.7uH	32 turns T68-6	yellow

Secondary windings; aerial input 3T, demodulator/mixer output 3T

T5 Calculated coil winding details & CX:

2u3H/220pF	22 turns	T68-6	yellow	22T	7.075MHz
3u4H/150pF	27 turns	T68-6	yellow	27T	7.048MHz
4u7H/110pF	32 turns	T68-6	yellow	32T	7.000MHz
5u1H/100pF	33 turns	T68-6	yellow	33T	7.048MHz

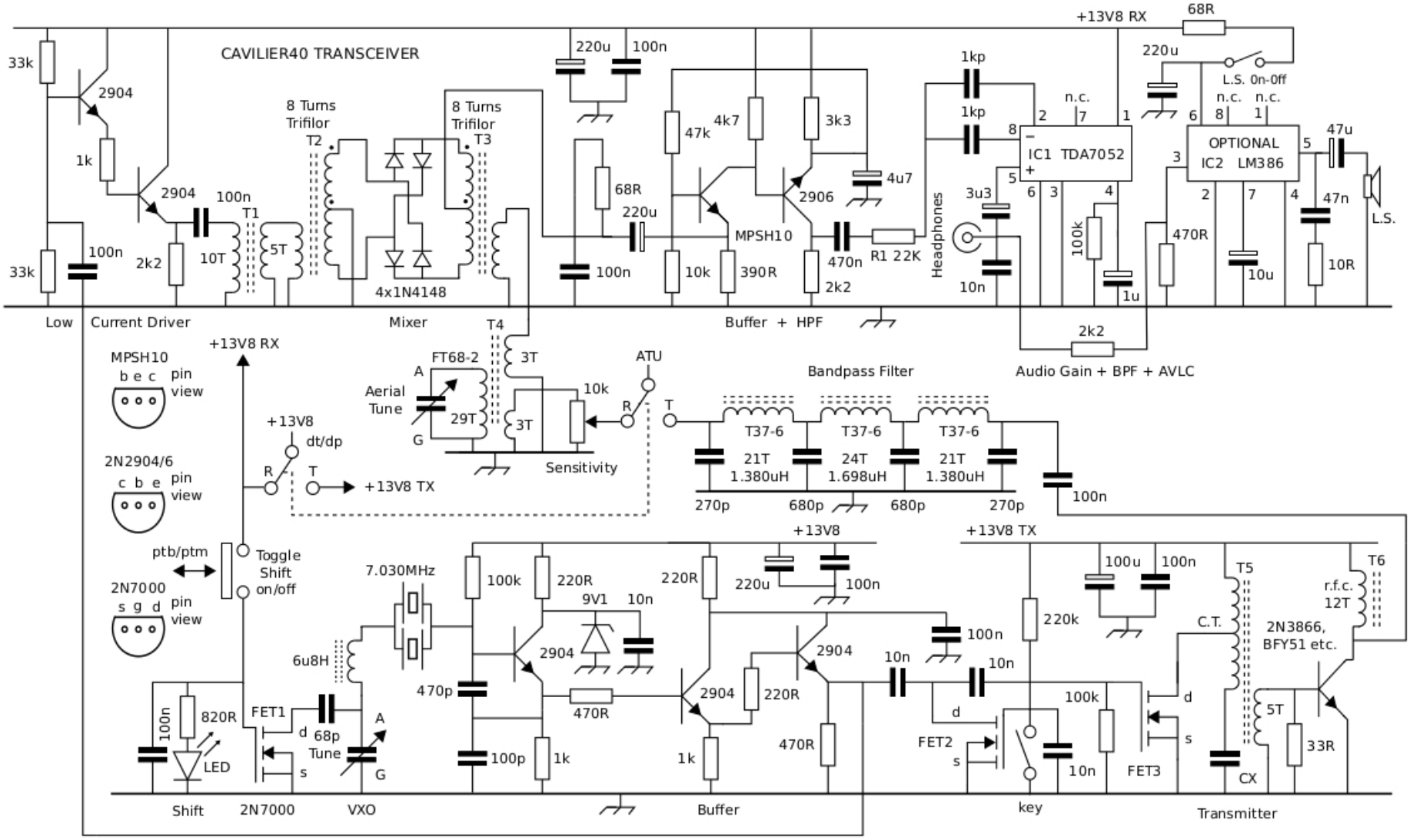
Centre Tapped

T6 – r.f.c. 12T FT50-43

Summary:
This article presents and promotes the TDA7052 as the complete signal processing solution for all Direct Conversion Amateur Radio receiver applications and was written on that basis.

There are two main reasons for adopting the TDA7052:
To gain the many advantages of incorporating an IC, which might as well have been, designed specifically for all amateur radio DCR applications, and also to incorporate existing DCR circuitry the basic building blocks of which have been developed by fellow radio amateurs, over many years.

The Cavilier40 puts out +1 Watt with a receive performance as might be expected from what is, a very simple receiver, it does form a stable development basis for further improvements. Improved 'front end' selectivity and multi band capability to name just two.


CAVILIER40 TRANSCEIVER
+13V8 RX
68R
L.S. 0n-0ff
33k
2904
1k
2904
100n
T1
8 Turns
Trifilor
T2
8 Turns
Trifilor
T3
4x1N4148
220u
100n
68R
220u
100n
47k
4k7
3k3
2906
4u7
MPSH10
470n
R1 22K
10k
390R
2k2
1kp
1kp
IC1 TDA7052
n.c.
n.c.
n.c.
OPTIONAL
IC2 LM386
47u
47n
10R
L.S.
Headphones
3u3
10n
100k
1u
470R
10u
33k
100n
2k2
10T
5T
Low
Current Driver
Mixer
Buffer + HPF
Bandpass Filter
Audio Gain + BPF + AVLC
2k2
MPSH10
b e c pin view
2N2904/6
c b e pin view
ptb/ptm
Toggle
Shift
on/off
2N7000
s g d pin view
+13V8 RX
+13V8
dt/dp
R
T
+13V8 TX
FT68-2
A
Aerial
Tune
29T
G
T4
3T
3T
10k
R
ATU
Sensitivity
T
T37-6
21T
1.380uH
T37-6
24T
1.698uH
T37-6
21T
1.380uH
270p
680p
680p
270p
100n
+13V8
+13V8 TX
7.030MHz
6u8H
100k
220R
9V1
10n
220R
220u
100n
2904
2904
2904
220R
470p
470R
100p
1k
1k
470R
100n
10n
10n
220k
100u
100n
T5
C.T.
T6
r.f.c.
12T
2N3866,
BFY51 etc.
100k
d
s
5T
33R
CX
100n
820R
LED
FET1
d
68p
Tune
s
A
G
FET2
s
key
10n
FET3
Shift
2N7000
VXO
Buffer
Transmitter

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- Number of your bank account in the box marked (4)
- Add the date and sign (5 and 6)

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_____ **(2)** Branch

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For the credit of	GQRP CLUB NUMBER 1 ACCOUNT			0 4 1 0 9 5 4 6
	Amount in figures	Amount in words		
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	Date and amount of first payment			Due Date and Frequency
Commencing	15-1-2015	£6.00	and thereafter every	ANNUALLY ON JANUARY 15th
	Date and amount of last payment			
*until	----------	--------	Until you receive further notice from me/us in writing	
Quoting the reference	**(7)** **GQRP #**		And debit my / our account accordingly	

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* Delete if not applicable

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QSL Bureau: Managed by - Mr D S Coutts GM3VTH, 29 Barons Hill Avenue, Linlithgow, EH49 7JU

QSL cards are sent out at regular intervals, in February, May, August, and November, in stamped addressed envelopes, paid for by the club. We no longer need to receive envelopes or stamps from members.

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1. Put the receiving stations membership number on the top right of the card.
2. Sort cards in ascending number order.
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North American members can send cards to:-
David Gauding, NFØR, 14220 Tullytown Court, Chesterfield, MO 63017, USA
David will send these in bulk to the UK bureau for distribution.

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Antennas.
Colin Turner, G3VTT, 17 Century Road, Rainham, Gillingham, Kent. ME8 0BG
will advise members on antennas to fit their location. Please send a plan, with dimensions, of your site and required bands, type of equipment and location of shack.

Technical Problems.
Ian Keyser G3ROO will give advice to members on circuit and construction problems. Please provide the fullest information possible. Write to Rosemount, Church Whitfield Dover. CT16 3HZ

Speaking in Whispers

Paul Darlington - m0xpd - 8 Uplands Rd, Flixton, Manchester

WSPR is the digital beacon mode, developed by Joe Taylor, k1jt, to facilitate informal study of propagation, described in these pages by Roger Lapthorn, g3xbm [1]. Since g3xbm's description, there have been a number of changes in technology and practice relevant to WSPR transmission of potential interest to members building their own equipment or operating /p. It is the purpose of these notes to summarise those changes.

Starting Rumours

In his SPRAT article [1], g3xbm described the situation in 2009 when it was assumed that the WSPR signal would be generated in a personal computer and output at audio frequency, suitable for transmission in SSB from a conventional amateur rig. Similarly, upon reception by a similar rig, the WSPR signal would be sampled and decoded by software running on a PC. Reception reports would then be transmitted to the central "WSPRnet" resource over the Internet. The central role of the PC in generating and decoding signals and in reporting reception tended to "shackle" WSPR operation.

Unshackled Whispers

Johan Bodin, sm6lkm, pioneered the generation of WSPR signals outside the PC. Johan's "MJB" software [2] for the PIC 16F628 microcontroller appeared soon after k1jt released WSPR in 2008. Johan also demonstrated how absolute timing of the WSPR transmission could be ensured using GPS technology, thereby securing another important element of liberation from the shackle of deriving absolute time references from (e.g.) an internet connection on a personal computer.

The opportunity to transmit WSPR signals from a portable location, or to "use your home station as a PC-less beacon", was further developed by Gene Marcus, w3pm. His early solutions, also based on PIC microcontrollers, generated the WSPR signals at AF. This made them suitable for injection into the audio input of an SSB rig and convenient for operators of commercial equipment, including those interested in /p operation. Gene's wide range of open-source solutions, including his recent Arduino-based systems, are available on-line [3].

Whilst signal generation at AF is fine if you are using a phone rig, this approach is not optimised for those building a bespoke WSPR beacon, for which purpose it is arguably more convenient to generate the WSPR signal at higher frequency…

Whispering at Higher Frequencies

WSPR has been generated by pulling a crystal oscillator, either directly at RF or at an intermediate frequency, followed by a further mix to the target RF frequency, not least in VCXO schemes described by both sm6lkm and w3pm. But, as Andy Talbot said back in 2009, "WSPR … is just asking to be programmed into a DDS source for automatic generation" [4]. This is now a particularly attractive option…

Those interested in building a dedicated WSPR modulator or beacon will find it convenient to exploit the frequency stability and controllability afforded by digital methods of RF synthesis using a simple microcontroller and an inexpensive DDS module.

This approach was anticipated in Johan's pioneering "MJB" software [2] which included means to control a DDS device and now is embodied in the "Ultimate3 QRSS/WSPR Transmitter Kit " offered by Hans Summers, g0upl [5], in open-source designs from Gene Marcus [3], in the author's open-source multi-mode beacon, which is available as part of the code accompanying the "Occam's Microcontroller" project [6] and elsewhere.

Other workers have demonstrated how more powerful single board computer systems can directly generate WSPR signals, such as Dan Ankers, md1clv's and Guido Ten Dolle, pe1nnz's work on the Raspberry Pi [7].

Whispering from the Hilltops

I am not a SOTA operator – I'm not built for the hills! But I don't see any reason why those who reach the top might not transmit a few Joules in this mode if a signal were conveniently to hand. Whilst the idea of a self-contained box capable of generating an AF WSPR signal [3] is one option, it does represent extra weight. There is another way…

There is an application available for iPad, "iWSPR Tx", written by Federico Romano, iw2mvi, to generate WSPR as an audio signal [8]. I understand that some SOTA operators already use such portable computing devices for other digimodes (PSK31 etc) and for logging – so no additional weight needs to be carried to the summit. I have no direct experience of this particular application and cannot comment on its quality.

Closing

These notes have highlighted recent changes in WSPR signal generation – making it easier to "whisper" from more sources and from more locations. With the appearance of computational power in even simple rigs (such as the Ten Tec "Rebel" and 'Patriot") these changes will be of interest to those who might like to transmit WSPR and similar modes from these rigs or from similar home-brewed systems.

These "new means" to generate signals reflect what WSPR has to offer to amateurs who operate qrp, /p or both – reminding us that WSPR remains a mode of interest to G-QRP.

Links and References

[1] "WSPR – what it is and what it can do", R Lapthorn, g3xbm, SPRAT 140, Autumn 2009
[2] http://www.gqrp.com/sprat.htm
[3] http://www.knology.net/~gmarcus
[4] "Data", A Talbot, g4jnt, RadCom, vol.85 no.2, Feb 2009
[5] http://www.hanssummers.com/ultimate3.html
[6] "Occam's Microcontroller", P Darlington, m0xpd, SPRAT 156, Autumn 2013
[7] https://github.com/threeme3/WsprryPi
[8] https://itunes.apple.com/gb/app/iwspr-tx-qrp-hamradio/id781433570?mt=8

A WSPR Frequency Calibration Tool

John S. Roberts, G8FDJ

Accurate frequency setting is an essential requirement for anybody wanting to use WSPR. The HF WSPR bands are only 200Hz wide, so an external method of accurately setting the receive frequencies is a useful aid . The method described below takes advantage of the popular AD9850 DDS module driven by an Alduino Nano micro-controller. A total of ten WSPR centre frequencies ranging from 160m to 10m are sequentially activated and the signal for a given band displayed using a computer sound card and the free spectrum analyser software "Spectran V2" [1]. The shortest repeat time for a signal is just a few seconds, so the waterfall display provides a series of pulses that can be easily distinguished from WSPR data. The screen shot of figure 1 shows how Spectran presents the output from this unit. The aim is to align the signal with the 1500Hz cursor position, which is the centre of the 200Hz wide WSPR band. The receiver bandwidth should be set for USB, so the method still requires the tuning accuracy of a few Khz. (The 1Khz CW signals shown on the waterfall display are an artefact of the USB sound card.)

An Arduino sketch has been uploaded to the G-QRP web site and is essentially an extension of the AD9850 DDS driver programme written by Andrew Smallbone [2]. A 16x2 LCD display flashes the WSPR transmit frequency as the signal is transmitted. There are two scan rates set by a toggling pin D7 of the Nano; either 2.5 seconds/ frequency (D7 = HIGH) or 0.3 seconds/frequency (D7 = LOW). The longer scan allows easier reading of the display and Rx tuning while the shorter period aids the Spectran waterfall display.

The DDS module will have improved stability if the 125 MHz oscillator module is thermally insulated. The photo of the completed test source shows a black silicon rubber thermal insulator made from "Sugru"[3]. Calibration was undertaken using the 10m WSPR centre frequency of 28.126100 MHz by comparing the spectran display with an accurate cw source. Corrections were made by trimming the 125000677 frequency shown in the Sketch at line :-

int32_t freq = frequency * 4294967295/125000677;

A calibration accuracy of about 10Hz was possible using the Spectran cursor and 10M frequency.

There are usually enough signals from the module to be detected without an aerial. However, the 80M and 160M bands can benefit from a short piece of wire on the SINB output of the DDS module.

Pin connections between the Arduino Nano and both the lcd display and DDS module are attached to the Arduino Sketch. A separate regulated supply was used to power the DDS module and lcd display, rather than rely on the 5v output from the Nano. Construction was based on "DAR-tec" matrix board and 0.1 inch PC connectors to support the modules.

[1] www.weaksignals.com
[2] www.rocketnumbernine.com
[3] www.sugru.com

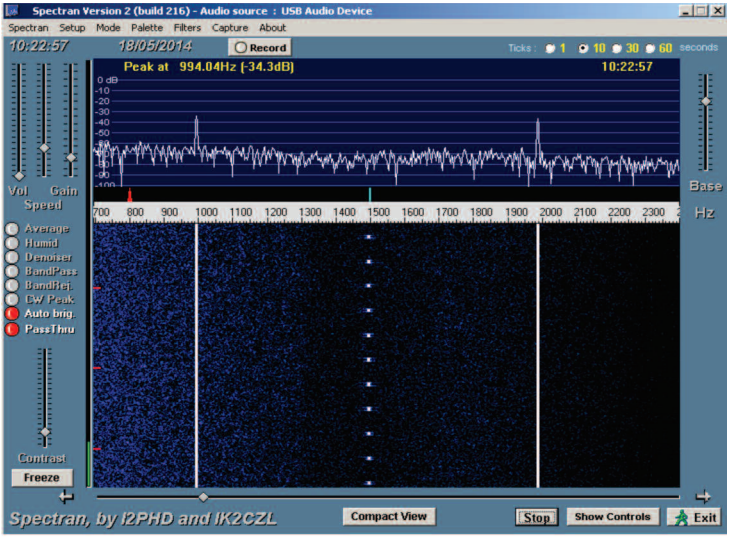
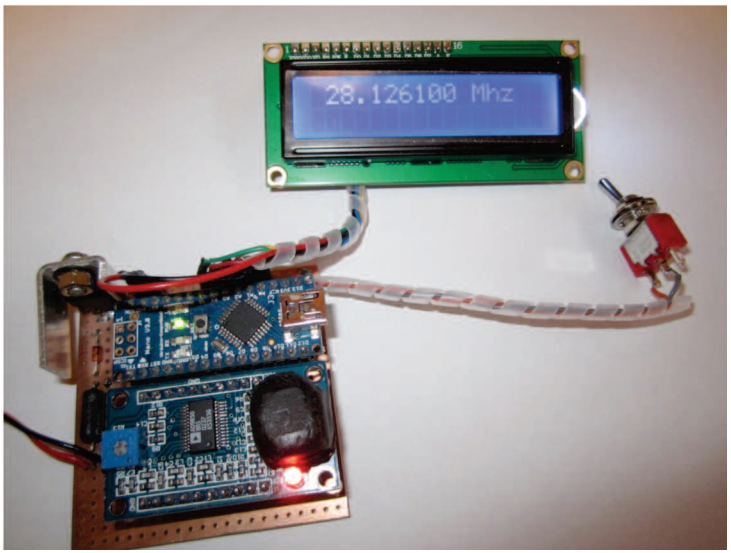


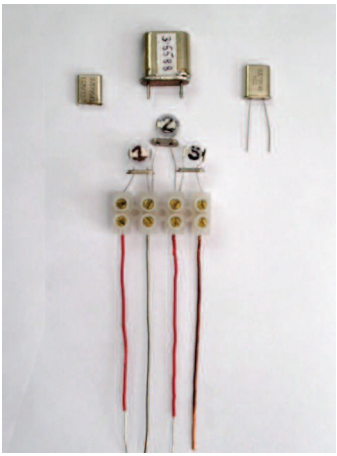
Figure 1



Completed unit with thermal insulation on 125 MHz DDS module

Crystal Doping

Eddie McLean, GM4EWM, 21, Milnefield Avenue, ELGIN, Moray, IV30 6EJ
GM4EWM@gmail.com



Changing Crystal frequency by surface sanding or graphite pencil application are old techniques used on 10X and other large crystals. As I had a number of wire ended HC49u 3.579545MHz type, I wondered if they could be doctored in a similar fashion.

Cut open the case at the bottom end, using a junior hacksaw with the small crystal gripped by pressing on a suitable surface. I used an upturned piece of carpet on the workbench. Take care to avoid breaking the leads.

The crystal is only 3/8" diameter. I made up a choc-block holder to mount individual crystals for testing. Using a permanent marker pen, apply the 'Dope' to either or both surfaces, testing the resultant frequency shift periodically. This requires a degree of experimentation. Methylated Spirit can remove excess 'Dope' to raise the frequency again. The process takes time to 'Cure' but stabilises after a few days.

I pulled the frequency down to 3.5523MHz and a bit more with the VXO. Two in parallel, had to be close in frequency to maintain oscillation. Using the same techniques with an HC6U case made a nice housing for the new Xtal. My 6L6 osc TX is just as happy with this 'Doped' Xtal as with an 10X.

G-QRP Club membership

Graham Firth G3MFJ

As you are no doubt aware, the Royal Mail (the UK postal service) has increased their prices again. This time, although they have increased inland postage, they have mainly hit overseas postage.

We can stand the increase in inland postage – the dropping of the member's handbook helped a lot, so UK subscriptions will remain the same at £6. Where else can you get a year's supply of superb magazines for such a small amount?

However, we are going to have to increase overseas subscriptions. We apologise to all our non-UK members, but it is out of our hands. We use the cheapest method of posting that is available but that is not enough. So, effective from now, European subscriptions will rise to £12, and DX subscriptions will rise to £13. For some reason, totally beyond our understanding, the European postage attracts VAT at 20%, so their increase is proportionally a little more. This is still a bargain for a magnificent magazine like Sprat!

These figures equate to €15.00 and US$22.00. If you renew after the publication of this issue of Sprat, then the new figures will apply. If members underpay we will hold your Sprats until we receive the balance.

We are keeping the limit on just the one year's renewal and you can only renew for 2015 after 1st November 2014. We have to do this as prices are very volatile as everyone knows, and we cannot afford to have advance renewals in case of price changes.

If you have a subscription that is already valid for 2015 (or beyond) you must not send any further subscriptions until your renewal date which is always shown on your Sprat label.

From the above, two issues arise for members who pay by Standing Order from a UK bank.

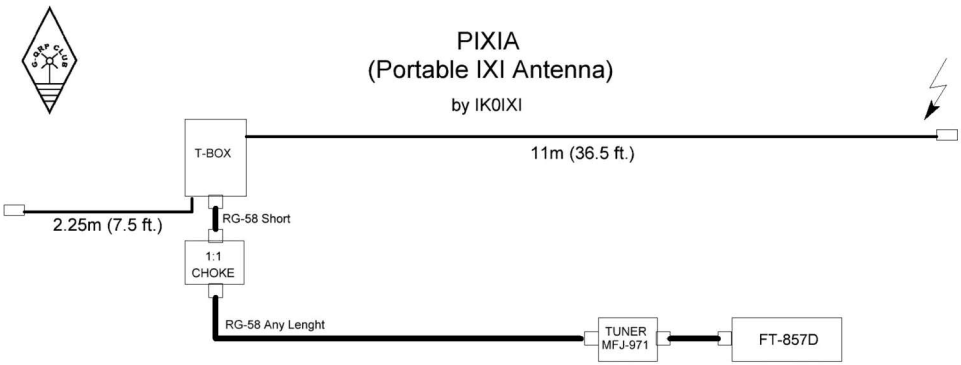
If your subscription is already valid for 2015 (or beyond) you must cancel your Standing Order now and only restart when your subscription has expired.

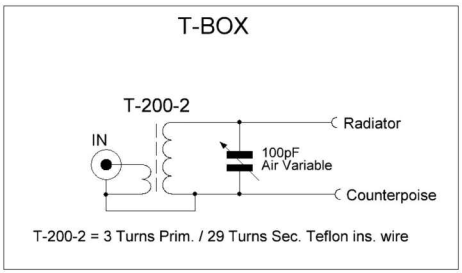
If you live overseas but have a UK bank Standing Order you must revise your payment in line with the new rates.

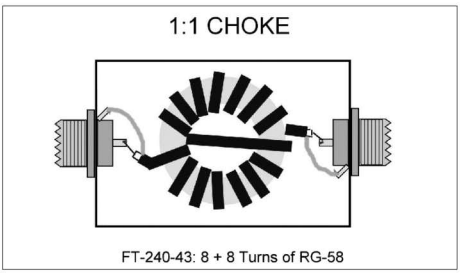
Antennas Valves and Vintage

Colin Turner G3VTT 17 Century Road, Rainham Gillingham, Kent ME8 0BG
G3VTT@aol.com

Welcome to a slightly different AAA. It's now called AVV! Over the last few years I've been following in the footsteps of Gus G8PG in producing 'Antennas, Anecdotes and Awards', a column he started in the 1970's in the early issues of Sprat. Since the Spring the 'Awards' part of my responsibilities have been taken over by Ryan G5CL and this has left me space in my allocated pages to perhaps offer you some ideas about operating or some valve circuits to try – particularly using some old valve or maybe early transistor designs from the early days of our branch of the hobby. I'll not forget the antenna designs which are so important so here is something again from our GQRP representative in Italy. Fabio, IX0IXI has been experimenting with portable antennas and has derived this simple idea once again using the counterpoise and balun arrangement he described before.







Fabio writes: Due to recent renovations of the camping site our mobile home was literally surrounded by others. So I had to resign to use only the wooden veranda to install a wire antenna. The veranda measures approximately 6.5 X 2.5m so I could only count on this room for my antenna plus a tree close to the mobile home. I thought about a short wire antenna inspired by the W3EDP trusting in the custom made tuning box and an MFJ 971 QRP tuner. It came out to a radiator of about 11 meters and a counter-poise for a little over 2 meters. The box tuning and short counterpoise were installed under the veranda roof, sheltered from the frequent rain, while the radiator was lying under the long side of the veranda and partially out to the tree. The counterpoise was lying under the short side. The feed point was accessible at any time so I could operate without problems of antenna tuning. The coax cable was equipped with a RF choke to prevent any RF in the shack. This choke was placed under the box tuning. The Pixia worked like a "random wire" brought into resonance, rather than to a defined antenna made many QRP QSOs on 40m/30m and 20m across Europe and Asia. I also had 2XQRP contacts, about two dozen (UK also), including 10 QSOs during the AGCW Contest (May 1).73 Fabio, IKØIXI.

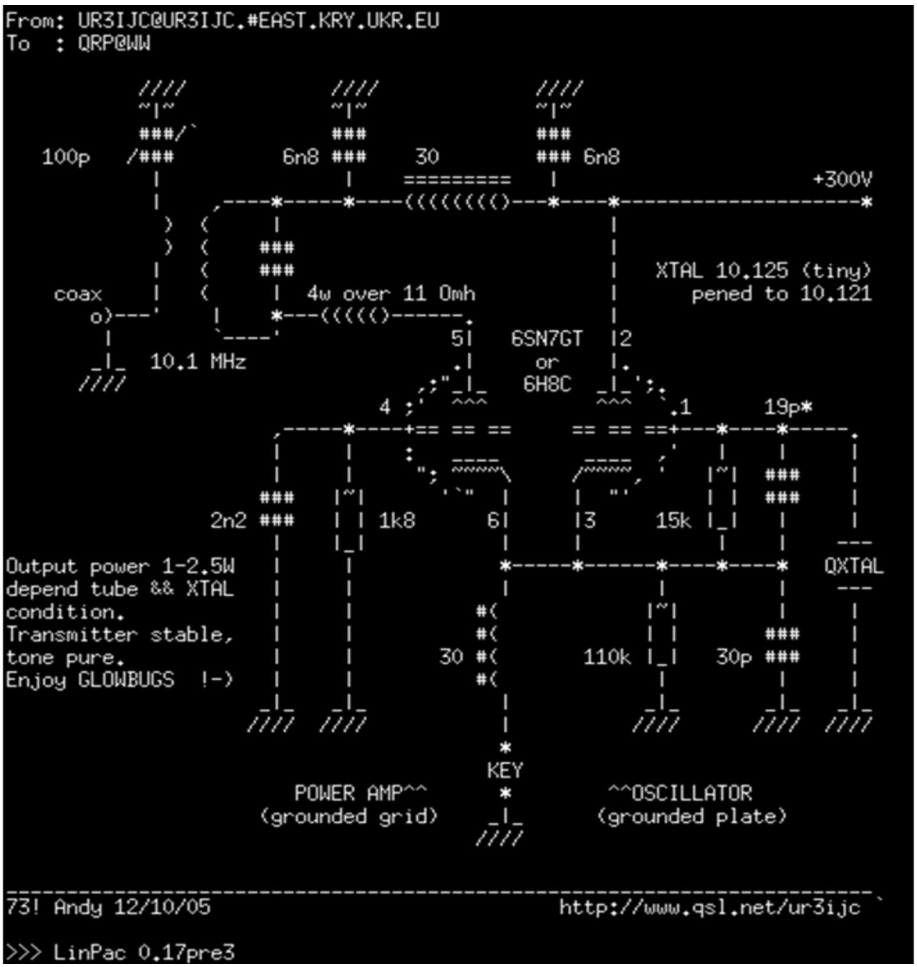
In Sprat 159 we published a design for a Diode Matching Unit from Panos M0LPS/SV3AUW. The battery as shown in the diagram, contained in the photograph, is incorrect and should be wired with the positive to ground. The diodes obviously need to be forward biased to conduct and give a reading on the balancing meter. Thanks to Brian G4SDL and others who spotted this.

Valve QRP Day Saturday November 15th 2014

This is an announcement for the next Valve QRP Day on **SATURDAY November 15th 2014**. This is a day set aside in the QRP calendar for those interested in using old time equipment or maybe equipment made using valves (tubes). This is your chance to use that old valve rig again at QRP levels. Any mode can be used according to your band structure although many GQRP members are using homemade valve transceivers these days or transmitters with their regular transceiver as a receiver. Activity is around all the QRP frequencies throughout the day. I am interested in receiving any short reports or photographs by e-mail. Any reports should be written in 'Word' to make it easier to cut and paste!

A Double Triode Transmitter

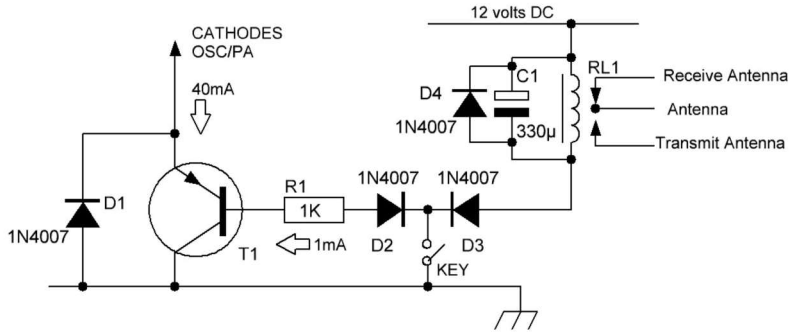
Writing and searching about valve QRP transmitters as I do on the internet regularly I stumbled across this circuit using a double triode in an unusual way as a crystal oscillator and a *grounded grid* power amplifier. The 6SN7, or 12AU7 if you want to use a smaller B9A version, is capable of 20 mA anode current which gives a healthy 6 watts input and 3 or 4 watts output which as a respectable QRP power level. Notice the 1K8 resistor, (1800 ohms), and the 2n2 pfd capacitor, (2200 pfd), which are used to give a combination of grid leak bias and decoupling to ground the grid to RF hence the strange values.



You may need to alter the values of the feedback capacitors, shown as 19 pfd and 30 pfd in the diagram, to allow operation on lower frequencies. The values stated are not preferred values and could be 27 pfd and 47 pfd which are normally associated with 80m and 40m crystals. A grounded grid PA stage at such power levels is rare although I once saw an American circuit using a power double triode designed for TV scanning purposes which permitted a greater input power. There could be some experimentation here if you have other double triodes locally. This is a very interesting circuit should be stable at all settings of the tuning capacitor in the tank circuit. Take a look at http://www.qsl.net/ur3ijc/ for further circuits and great ideas by Andy UR3IJC. Well done.

A Simple Semi Break-in Keying System for Valve Transmitters from **G3VTT**

Despite having an avid interest in valves and valve technology, (I always like to keep a firm grip on the safe reality of the past), I have had to resort to a semiconductor keying transistor and a relay to give smooth change-over on my one valve crystal controlled transmitter. The circuit relies on a capacitor across the antenna change over relay to give a hold in time when the key is being used to stop relay chatter and a transistor keys the cathode current of the oscillator. I had a little sparking on the contacts of my pump key and cootie keys and transistor keying reduces the current to a few milliamps. The diodes



allow two circuits to be keyed at the same time. I use 1N4007 or 1N5408's for everything as they have a high PIV and never fail. The capacitor across the relay may need to be selected to give the required hold in time with differing relay coil resistances. I used a relay from a Pye mobile radio telephone which was a 12 volt device. You could have a full QSK system but I get the feeling it would be too noisy and the relay would fall apart as you sent a stream of dots! The MJE350 transistor, (watch out its PNP), can handle the cathode voltage at key up and current at key down. If you key a really large valve like a 6146 or an 807 with higher HT you may need a different device with higher breakdown voltage characteristics and collector current capabilities. Use the internet to find a device, don't ask me! The circuit could be adapted for any cathode keyed transmitter and provides a neat solution to station control. Yes, you could put it into yet another little box for your QRP station. See you on Valve QRP Day which will be on SATURDAY November 15th 2014. Please send any antenna ideas and circuits to me in 'Word' here at g3vtt@aol.com.

Watch out says Doris! Valves use high voltages!

COMMUNICATIONS AND CONTESTS

Dom Baines, M1KTA, 34 Bury Road, Stapleford, CAMBRIDGE. CB22 5BP
m1kta@gqrp.co.uk

Once again I travelled out to Sweden for the RSGB IOTA contest and thanks to all GQRP members for the contacts both inside and outside the contest.

Summer Sizzler
As I write this the August Bank Holiday is almost upon us and I will be operating as I am able to from the beach in Cornwall. David G3WGN, #5279 has been advising on the construction of a VDA antenna and I will have one for 10m and 12m up this weekend on Towan Sands, Hayle beach although the higher HF bands are not dazzling as they had been earlier this year. I plan on activating the WARC bands mostly (10m, 12m and 17m) . This will be in addition to the more usual HF (20m, 30m, 40m and 80m) frequencies. Remember all those G – EA and EA to elsewhere contacts count towards the EA3EGV memorial contest.

Winter Sports
Christmas and the New Year are months away and operating from a freezing shack might seem very distant as we have a mini heat wave and you are probably operating from the beach. However, when this copy of SPRAT arrives you will probably be ready to start to think about Winter Sports. The dates as always are between Boxing Day and New Year... 26th December to 1st January.

Operating for all these activities should take place on and around the International QRP Calling Frequencies.

CW: 1810, 3560, 5262, 7030, 10116, 14060, 18096, 21060, 24906, 28060
SSB: 3690, 7090, 14285, 21285, 18130, 24950, 28360 kHz

I recommend if there are a few stations on frequency spread out a bit if you can.

It is usual for operators to exchange their G QRP Club membership number when making QSO but it is not essential. Those taking part are invited to submit logs and comments to the G QRP Club Communications Manager, Dominic Baines, M1KTA, email at m1kta@gqrp.co.uk, Dom Baines, M1KTA, 34 Bury Road, Stapleford, CAMBRIDGE. CB22 5BP.

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OFFER – 2-beam scope 20MHz g.w.o. portable, FT101E with mike and manual, g.w.o. Free to collect! From G0SDQ tel: 01761 432 260, Les Talkowski #06562

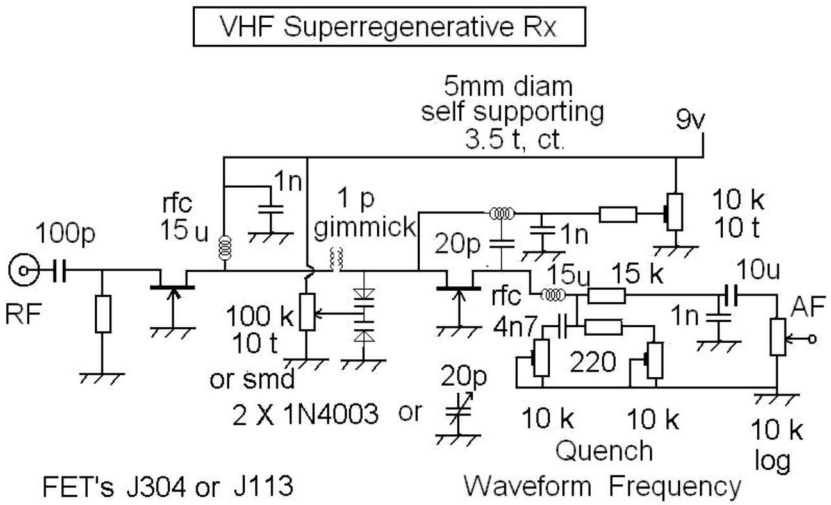
VHF Managers Report

John E. Beech, G8SEQ 124Belgrave Road, Wyken, Coventry CV2 5BH
e-mail: john@g8seq.com Tel.: 07958 777363 Loc.:IO92gk

Sad to say activity is still low on the VHF bands when I have the time to operate. I did manage to work twelve stations on 2m SSB during the RSGB contest, in between teaching a couple of students the Foundation Licence. I've also been listening for meteor pings from the GRAVES Tx on 143.050 MHz. This is a satellite tracking CW radar station in central France beamingin an 180 deg arc towards the Med. & North Africa. You won't usually hear the direct signal but if you tune a few hundred Hertz LF of the carrier (ie 143.04930 MHz) you should start hearing pings and bursts with large Doppler shifts (like bombs dropping) Longer burst with steady Doppler shifts lasting several minutes are low orbit satellites. I've tried some random SSB calling without success yet but will be getting set up for FSK441 mode in the near future. Both my FT-817 and FT-897 will tune down low enough. If you have an older rig which doesn't then you might like to build yourself one of these:

A VHF Superregenerative Receiver

A while ago at Rishworth Colin G3VTT said : "What we need to generate some activity on VHF is a nice simple Superregen." More recently Steve G0FUW required a simple Superregen for the Aircraft Band as a design school project. Basically they get a bag of bits, design ta PCB using CAD and build it. You'll have to buy your own bits and make your own PCB/bread board/Manhattan style unless the school comes up trumps and produces aboard for us! So here it is. I don't claim any originality for it; I've cribbed a lot of the stuff off the net and re-specified the devices. If you stretch the main tuning coil or drop half a turn off it it will tune the 2m band as well..



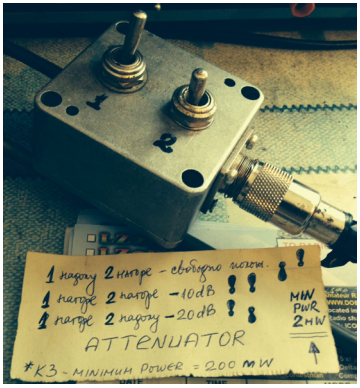
G8SEQ, based on an American design.

MEMBERS' NEWS

by Chris Page, G4BUE

Highcroft Farmhouse, Gay Street,
Pulborough, West Sussex RH20 2HJ
E-mail: chris@g4bue.com

LZ2RS has been 'milliwatting' with the equipment pictured below, a homebrew attenuator and Oak Hills Research WM-2 wattmeter, with some impressive results - working a JA and USA stations in AL, MA, ME, OH and WI with just 1mW on 10 and 20m. Like me back in the 1980s, Rumi has found the most accurate way to get down to 1mW is to use an attenuator starting with a known power level such as 5W. Also like me in the 1980s, he wants to be certain the very low power levels he is using are accurate, and had a friend, **LZ2JR**, who is an engineer, check his equipment. Boris found the minimum output power level on Rumi's Elecraft K3 is 160-170mW. Rumi has another friend, with special Japanese equipment who works for a TV company, visiting in August to make more checks on his equipment.



EC5ACA mentions the annual EAQRP Meeting held in Sinarcas (about an hours drive from Valencia) every year. This year's event was held on 24/25 May. **G7ENA** manned a G-QRP Club stall at the Spalding Rally on 1 June. Once again the intrepid pair, **GM4VKI** and this time **G(M)3MFJ**, ventured to the wild of Scotland to be at the Crianlarich Rally on 3 August where 18 members signed in with an attendance of 95, some members travelling well over 200 miles to get there. Roy says one member living on the Island of Soay off Skye rowed out to his boat, sailed three miles to Skye and then by van to Craianlarich - now that's dedication for you! The next appearance will be at Galashiels on 19 October. Roy says, "Don't forget the new rally in Aviemore on 3 May 2015. Traders and societies are booked to come so pop it in the diary. Hopefully lectures as well".

DF3OL wanted to build an antenna but his landlord was not so enthusiastic and so Jurgen put a fibreglass mast to the house wall and attached a garland and flags for the football World Cup in Brazil (photo right). He also attached a wire to the mast, 25.6 feet tall without radials, after **M3KXZ**, to get him QRV with 4W from his K2. Now the World Cup has finished Jurgen has to find another excuse for the mast! **G3VTT** was QRV in July from Ameland Island in the Dutch Friesian province on 40m CW with his K1 at 5W with a new Li-ion battery and a low wire from a wooded area near the beach. He then went south to West

Kappelle on Walcheren to operate on the beach there. The internal tuner in the K1 loaded fine with 85ft of antenna and a 30ft counterpoise. Next year Colin will go back to Vlieland and Schiermonikoog to complete his cycle tour of the whole island chain and take QRP equipment, plus his Brompton bike again.

M1KTA was QRV from Garpen (EU-037) as **SM7/M1KTA/P** for the IOTA Contest in July using his KX3 to a vertical dipole for 20-10m, a GP for 40m and dipole for 80m. Dom QSO'd your scribe on 30m with two-way 5W QRP just before the contest, and followed up with a QSO with a USA station. Between 3/30 November **DE3BWR** and **DDØVR** will be QRV from the Seychelles islands of Mahe, Praslin and La Dique as **S79VR**. Although they will use 500W SSB on the IOTA QRGs, they will use 5W on the QRP QRGs with a KX1 to a vertical, single quad, double-zepp and a Currentsumeantennakit by **DL1VU**. **IKØIXI/P** was QRV 14/24 July from Lake Trasimeno, near Perugia with his FT-857D at 5W, and then as **IKØIXI/M** SSB/CW from Lake of Pietrafitta, a new one for the Italian Lakes Award (DLI), with an outback 1899 whip on his Ford Focus SW. Fabio's 130 CW QSOs included **BY4IB**, **HT5T**, **KF3B** , **V44KAI**, **W3YY** and **ZY14RR** on HF, **6V7S** on 40m and two-way QRP QSOs with DL, F, G, I, S5 and SM.

GØOOG has had a good year on HF, particularly on 12m. Out of about 140 5W QSOs since the beginning of the year, David has worked 44 DXCC including **D44CF**, **FR/F5MNW**, **FG5FR**, **JR4GPA**, **MJ/DL7PR**, **E45SL**, **VU2RBI**, **PY2ZEA**, **5B4AIZ**, a number of Ws including **W1AW/8**, **W1AW/3** and **LU1YT**. In the BERU (Commonwealth) Contest he QSO'd **VE3JM**, **JG3EA**, **C4Z**, **J34G**, **VP2MXI**, **VK3TDX**, **ZS1EL**, **5N/RN43QO** and **9H3AL**. He says, "At times band conditions were good but strangely I seem to pick the DX up at slightly quieter times - eg **LU1YT** was the only signal on 12m when I worked him - he came up out of the noise I worked him and then he faded out! Using his 22ft gutter dipole and his 5W DX-70TH with ATU, **M5AML** worked **MCØSHL** on 20m, **PY6RT**, **TM2ØØNB** and **MMØZBH** on 17m, and **ZD7FT** and **CR8ABF** on 15m. He also logged quite a few of the Spanish AMØ stations but failed to break the ZY14 pile-ups.

N2CQR says his station seems a bit more British ever since he home-brewed a 17m Moxon (photo left). The antenna (that **G4WIF** proclaimed as "a thing of beauty") is made from scrap wood and fishing poles and is held aloft by a tripod that Bill last used in HI8 land between 1993 and 1996. He says, "Three cheers for Les Moxon! With the antenna I work just about every European station I hear, and I hear a lot of them. I've also worked 4X and A9, all with the 5W BITX TCVR".

G3CWI has been busy developing some more QRP-related items. Richard says *Flight Decks* are an ergonomic solution to portable operating for users of the Elecraft KX1, HB1B and Weber Mountain Topper, see <http://www.sotabeams.co.uk/search.php?search_query=flight+ deck&x=0&y=0>, and *Mini Traps* have been designed (with lots of user feedback) for use with lightweight portable antennas. Apparently USA users mostly throw antennas into trees and so they want hardware that will not get snagged, see <http://www.sotabeams.co.uk/mini-traps/>. **G6YBC** says the Texas Topper from Rex at QRPme is now available through Kanga Products (UK), only the 40m version at present but other bands are due shortly. **W1REX** says two new items are available on the QRPme website: *Sampler Pack* is a sampler of DIP SOIC MePads with 70+ MeSquares and a random MeTube paddy board, see <http://qrpme.com/?p=product&id =SAM>, and *Special PCB Stock* is a

weird feeling piece of PCB material that has a special copper nodularisation coating that enhances the transfer process when making boards using the toner heat transfer method, see <http://qrpme.com/?p=product&id=SD4>.

Pictured right is **G3XIZ**'s 'almost finished' 60m TCVR that he only needs to make final adjustments to the AGC and S-meter circuits to finish. The unit has a DC RX with an audio filter and the TX uses an FET PA of **GW3UEP**'s design. Both TX and RX are fed from a common Vackar VFO, the frequency of which switches as the key is depressed. Thus it has full QSK facility and will deliver either 5W or 20W output, depending on the PA supply voltage. Chris says he has 'atrocious' local noise so uses the RX with a small active loop antenna which improves matters somewhat. He finds 60m excellent for inter-G working, especially on 5260kHz and the QRP channel 5262kHz, as there are no contests and no rubber stamp 599 QSL PSE type QSOs, and so is a great band for rag-chewing and improving one's CW. Chris frequentoy monitors 60m and, apart from **G3ICO**, **G8TMV**, **G4XRV**, **GW4LPB** and **MØJXM**, has been surprised and disappointed at the low activity, especially by QRP stations. He says, "Hopefully a few more QRP stations will become active on this superb but under-used band".

Still on 60m, **G8TMV** says members who have one of **KD1JV**'s ATS3B QRP six-band CW TCVRs might be interested in knowing that with the addition of 60m it is now a 'seven-band' radio. Back in May Colin uploaded modified ATS3B firmware with bug fixes and 60m support, and since then has been more testing. He says, "A couple of other people have built up 60m band modules as well and I think I am now at the stage where I can declare this to be working. The updated firmware is in the files section of the ATSprint Yahoo group as ats3b_digi-33.zip. If you don't want to sacrifice an existing band module then I believe Steve might have some spare band module PCBs. I also have a few since I cloned the PCB layout and got some made".

Turning to 2m, **M5AML** made three QSOs in the WAB 144MHz LP Phone Contest - two more than last year! John used his TR-751E at 5W into an indoor 5 ele yagi to make other QSOs with **GB2RM** and **GB5HW** on FM and **GW2OP/P**, and **GB1YOTA** on SSB

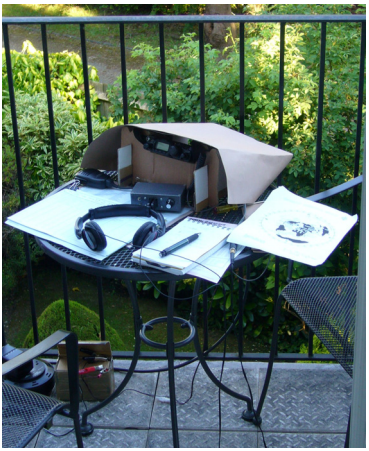
LZ2RS made 630 QSOs in the IARU HF Championship in June running 5W from his K3 mostly on 20 and 15m to a Cushcraft A4S (4 el tri-band yagi) mounted 26ft above the roof of his seventh storey building, making it 100ft above ground. Rumi uses inverted vees on the same roof for 40 and 80m and says he is sure the wet ground where the building is located helps his signal. **GM4HQF** made a few QSOs on 15m in the same contest, including special contest stations **N1U**, **K1U** and **K1T** and **G3YMC** also entered the contest, making 262 QSOs with his 5W, including quite a few USA stations, but was only able to QSO one of the special contest calls

On 20 June **G6XDI** 'easily' QSO'd **MM5GAC/P** on Isla (EU-008) and **MSØWRC** on Tanera Mor (EU-092) from his London QTH using 5W on 40m. On 18 July **WB3AAL** made a two-way QRP QSO on 15m with **IK2YSE** and on 19 July at the beach with his 5W and three-band 23ft long wire antenna on a roach pole (no earth), **GØFTD** had 'proper' QSOs with **GB1TA** on 30m and **W4SCV** and **JH1USR** on 17m. When Andy checked the Reverse Beacon Network (RBN), he was even more surprised to see his signals had reached the west coast of the USA.

Builders at YOTA UK.

Dan, MØTGN, with builders at the Bath Royal Literary Science Institute.

The Bath Buildathon Crew have been continuing to promote radio construction with young people (photos above). In June they led a workshop at the Bath Royal Literary Science Institute and in July helped out at the RSGB Youngsters on the Air (YOTA) event in Wolverhampton. **GØFUW** reports a total of 30 youngsters built 20m PSK receivers. Another 30 kits were lost by Parcel Force on the way to the YOTA Finland gathering so never made it.



GØOOG tried 6m this year from his balcony shack (photo right). He assembled and erected a 3 el OWL yagi from **GØKSC** (photo below right) just 84 minutes before the start of the RSGB Trophy Contest in June and says being a project manager, he was appalled at his timing! David achieved 22nd place and, as far as he can see, is the only QRP entrant (see **G6XDI** below!), which he says is sad because 6m works well for QRP. He says this has been a 'strange' year for 6m because although the antenna has enabled him to work 22 DXCC, that total doesn't include HB9, OE, F, ON, PA 5B4, TK, and a number of other 'low hanging fruit' that would easily add to the country score. His best DX is **UT1S** and **VY2ZM**. **G6XDI** also entered the Trophy Contest and made 30 QSOs around Europe, including ISØ for a new DXCC. Chris used 5W from his FLEX 1500 into a Cushcraft 3 ele yagi.

Thanks to all the contributors. Please let me know how your autumn goes for the winter edition of *SPRAT*, in particular what you have been building, who you have been working, and any other information, news, ideas, suggestions or opinions about QRP, by 10 November 2014, also, interesting photographs. How about a shack photograph to let other members know what you and your equipment look like? Let me know if you intend operating from somewhere other than home during the winter and spring months, especially in the Winter Sports, so I can let members know to listen out for you.

Look at 'www.celticpilgrim.com' * for Amateur Radio and Lovely Scenery Between the Mountains and the Sea

G3RJV has a Wooden Lodge situated in the Dyfi Valley in central Wales close to the Irish Sea and in the Snowdonia National Park. Refurbished with a large living area, conservatory, double bedroom, twin bedroom plus a double bed sofa in the living area. Naturally there is a small amateur radio station with a QRP HF transceiver and a 2m multimode. An easy to use station in a quiet location with lots of local places to visit and a vast open sandy beach only 3 miles away.

Look on the webpage above or for leaflet write to G3RJV
or email g3rjv@gqrp.co.uk

*If there are problems with the website URL; Google ***Acelticlodgeforrent*** to find it.

GQRP Club Sales

Graham Firth, G3MFJ, 13 Wynmore Drive, Bramhope, LEEDS. LS16 9DQ

Antenna Handbook – 2nd edition – members £6.00, non-members £10.00 plus post } £2.00 (UK) or £5.50 EU
Radio Projects volumes 1, 2, 3 & 4 – by Drew Diamond – members £5, non-members £10 } or £8.00 DX per book

6 pole 9MHz SSB crystal filter (2.2kHz) £12 plus post (max of one) } £3.00 (UK); or
Polyvaricon capacitors – 2 gang (A = 8 to 140pF, O = 6 to 60pF) c/w shaft extension & mtg screws - **£1.50 each** } £3.50p (EU); or
– 2 gang – (both 8 to 295pF) c/w shaft extension & mounting screws - **£1.50 each** } £4.50p (DX)

Pair LSB/USB carrier crystals HC49U wires - [9MHz ± 1.5kHz] **£4 pair** } **All components**
HC49U (wire) crystals for all **CW** calling freqs – 1.836, 3,560*, 7.015, } plus **postage**
7.028, 7,030*, 7.040, 7.0475, 7.122, 10.106, 10.116*, 14,060*, 18.086, 18.096, } **(ANY quantity)**
21.060, 24,906, & 28,060 all are **£2.00 each** (* = also available in low profile HC49/S) } £1.20 (UK), or
HC49U crystals- 1.8432, 3.500, 5.262, 7.00, 10.006, 10.111, 14.00MHz – **50p each** } £3.50p EU, or
HC49U crystals – 2.00, 3.00, 3.20, 3.579, 3.5820, 3.6864, 4.0, 4.096MHz } £4.50p (DX)
4.1943, 4.433, 4.5, 5.0, 6.0, 7.2, 7.6. 8.0, 9.0, 10.0, 11.0, 12.0, 13.50, 15.0, 16.0, 20.0, }
24.0, 25.0, 26.0, 27.0, 28.0, 32.0MHz – **all 35p each** (Some of these are low profile types) } Post free
14.070MHz – 20m PSK – set of 3 crystals - **£2.55** } if ordered with
Ceramic resonators – 455, 480kHz, 2.0, 3.58, 3.68, 4.00, 14.32 & 20.00MHz **– 50p each** } with heavier
Diodes - Schottky signal diode – 1N5711- 20p each; 1N4148 GP Si – 10 for 10p } things
Varicap diode – **MVAM109** – 40pF @ 9v, 500pF @ 1v. **50p each** } like binders, toroids
SA602AN - £1.50 (note – I may supply NE or SA, 602 or 612 as available. All are fully interchangeable. } polyvaricons
MC1350 - £2.00 These are getting in short supply now so max of 2 per member } or filters
LM386N-1 - 4 to 15v, 300mW, 8pin **DIL - £0.40, LM386M-1 SMD – 35p** } Use just
TDA7052A - 4.5 to 18v, 1W 8pin **DIL** low noise & DC vol control – **£0.60 each** } that postage
TA-7642 Radio IC – direct equivalent of **MK484** (& ZN414) – **75p each** } If ordered
2SC536 transistors (npn) fT - 100MHz, hFE-320, VCBO +40V **- 5 for 50p** } with books
MPSH10 transistors (npn) fT - 650MHz, hFE 60, VCEO 25V **- 8p each** } or CDs
2N3904 transistors (npn) fT - 300MHz, hFE-150, VCBO +40V **- 10 for 50p** } add
2N3906 transistors (pnp) fT - 250MHz, hFE-150, VCBO -40V **- 10 for 50p** } this
BC517 Darlington (npn) fT - 200MHz, hFE-30,000, VCBO +40V **- 13p each** } postage
FETs - IRF510 – 50p; 2N3819 - 17p; 2N7000 - 10p; BS170 – 8p - all each } as books
Dual gate MOSFET – BF981 - SOT103 - 1GHz (diode protected gates) **- 85p each** } or CDs
Pad cutters – 2mm shaft – 7mm o/s, 5mm i/s diam – 5mm pad with 1mm gap **£6.00 each** } do not
10K 10mm coils – 0.6uH, 1u2H, 1u7L, 2u6L, 5u3L, 11u0L, 45u0L, 90u0L, 125uL – all 80p each } travel well
Magnet Wire – 18SWG – 2 metres – 60p; 20 & 22 SWG – 3 metres - 60p; } with parts.
24, 25 & 27SWG – 4 metres - 40p; 30, 33 & 35SWG – 5 metres - 30p. }
This is solderable enamel insulated. Max of 3 sizes per member per order } Postage
QRP heatsinks - TO92 – 30p; TO39/TO5 – 40p; TO18/TO72 – 60p (pics in Sprat 148) } as for
Axial lead inductors (they look like fat ¼W resistors) these are low current }
4.7, 6.8, 10, 15, 18, 22, 33, 39, 47, 56, 100, 150, 220 and 1000 - all uH and all 18p each. } components

Toroid Cores – **priced per pack of 5 – max of 2 packs of each per member**
T25-2 – 50p, T25-6 – 60p, T30-2 – 60p; T30-6 – 70p ; T37-2 – 75p; T37-6 – 80p; T50-1 - £1.00; T50-2 – 90p;
T50-6 – £1.10; T50-7 - £1.20; T50-10 - £1.20 ; T68-2 - £1.80 ; T68-6 - £2.20; T130-2** - £1.50ea ; T130-6** - £2.00ea. FT37-43 – 80p ;
FT50-43 - £1.20 ; FT37-61 - £1.20 ; FT50-61 - £1.60; BN43-2402 - £1.20; BN43-202 - £2.00; BN43-302 - £2.00; BN61-202 - £2.40.
Ferrite beads – FB73-101 (3.5mm dia x 3.2mm long, 1.2mm dia hole) – 40p for 5
All toroids are plus postage – up to 5 packs = £1.20 (UK), £3.50 (EU), £4.50 (DX). Each additional 5 packs, please add 50%
**** Except ** items** – they are heavy and each counts as 2 packs (ask for quote if you want more than 2 of the large toroids)

SBSS PCB clamps – single - £12, two - £20 all plus post (£3.50 UK & EU : DX – order direct from Rex please)

MeSquares & MePads - £6.50 each plus post (£3.00 UK & EU : DX – order direct from Rex please)

Limerick Sudden kits RX & **TX** both single band (160 through 20m); **ATU** (80 through 10m) **£38.00 each plus post**
UK - £3.50, EU - £5.40, DX - £8.00

Sprat-on-DVD – 1 to 148. Only £4 each to members plus postage, UK - £1.20, EU - £3.50, DX - £5.00

Sprat Binders – nylon string type – Black with club logo on spine -16 issues per binder – **new stock** - £5.00 each plus postage
(one: UK - £2.00, EU – 3.00, DX - £4.00. More - add £1.10, £1.50, £2.50 each)

Cheques (UK) and payable to G-QRP Club. Sorry, but cheques in other currencies are uneconomical to us due to bank exchange charges!

MINIMUM ORDER for cheque or PayPal payments is £5 For orders less than £5 – please use postage stamps (any denomination) - any quantity of stamps is OK, or cash. I can accept cash in GBPounds, or US$/ €uros (at the current exchange rates) – but please send securely! You can order via e-mail and pay by PayPal - use g3mfj@gqrp.co.uk – and pay us in GBPounds and you MUST include your membership number and address please.
PayPal charge us about 4% so a contribution towards that is always welcome, or, send as a gift - thanks